THIRD TERM E-LEARNING NOTE

SUBJECT: BIOLOGY **CLASS: S. S. ONE**

SCHEME OF WORK

WEEKS	TOPIC
1.	Micro-Organisms Around Us and the Concept of Culturing.
2.	Micro-Organisms in Action.
3.	Sexually Transmitted Infections (STI)
4.	Towards BetterHealth
5.	Relevance of Biology to Agriculture
6.	Pests and Diseases of Plants.
7.	Pests and Diseases of Animals.
8.	Food Storage and Production.

REFERENCES

- Modern Biology for Senior Secondary Schools by S.T. Ramlingam
- Essential Biology by M.C Michael
- New Biology by H. Stone and Cozen
- SSCE, past questions and answers
- New System Biology by Lam and Kwan
- College Biology by IdodoUmeh
- UTME, SSCE and CAMBRIDGE past questions and answers
- Biology practical text

WEEK ONE **DATE: .....**

MICRO-ORGANISMS AROUND US

CONTENT

- Description and Groupsof Microorganisms
- Concept of Culturing
- Identification of Microorganisms
- Carriers of Microorganisms

DESCRIPTION AND GROUS OF MICROORGANISMS

Micro-organisms otherwise called microbes or germs can be defined as living things which cannot be seen with unaided eye but by the use of microscopes.

They exist almost everywhere, in water, air, soil, surface of objects, as well as on and within living organisms. They are carried by air currents from the earth's surface to the upper atmosphere. They occur most abundantly where there is food, moisture and adequate temperature for their growth.

It was the invention of microscope that opened the gateway to the world of these minute living organisms. The first person to discover microbes was a Dutch man called Anthony Leeuwenhoek (1632-1723). Using a simple microscope, he was astonished to discover that rain water that had been collected from pools was full of little organisms.

GROUPS OF MICRO-ORGANISMS

Micro-organisms include all viruses, bacteria and the protists. Others are the cyanobacteria, certain fungi and algae.

1. **BACTERIA:** These are minute unicellular organisms or simple association of similar cells which multiply by binary fission. Most bacteria cells range between 0.2 μ-2μ in diameter and 0.0005mm-0.002mm long. Each bacterium cell has a cell wall with cytoplasm. There is no well defined nucleus. Consequently, they are **prokaryotic organisms**.
   There are different kinds of bacteria showing a range of shapes. Certain kinds of bacteria have long thread-like structures called **flagella** which assist in locomotion. Bacteria with spherical shape are referred to as **cocci** (singular-coccus). There are several forms as shown on the next page.

   Streplococci- These are arranged in chains. They cause sore throat.

   Staphylococci- These stick together to form irregular bunches. They cause boils.

   Diplococci- They occurs in pairs. e.g. pneumococci which causes pneumonia.

   Bacilli- They is rod-shaped. They cause typhoid fever.

   Spirilla (singular = spirillum)- These are rod-shaped bacteria twisted into a spiral shape.

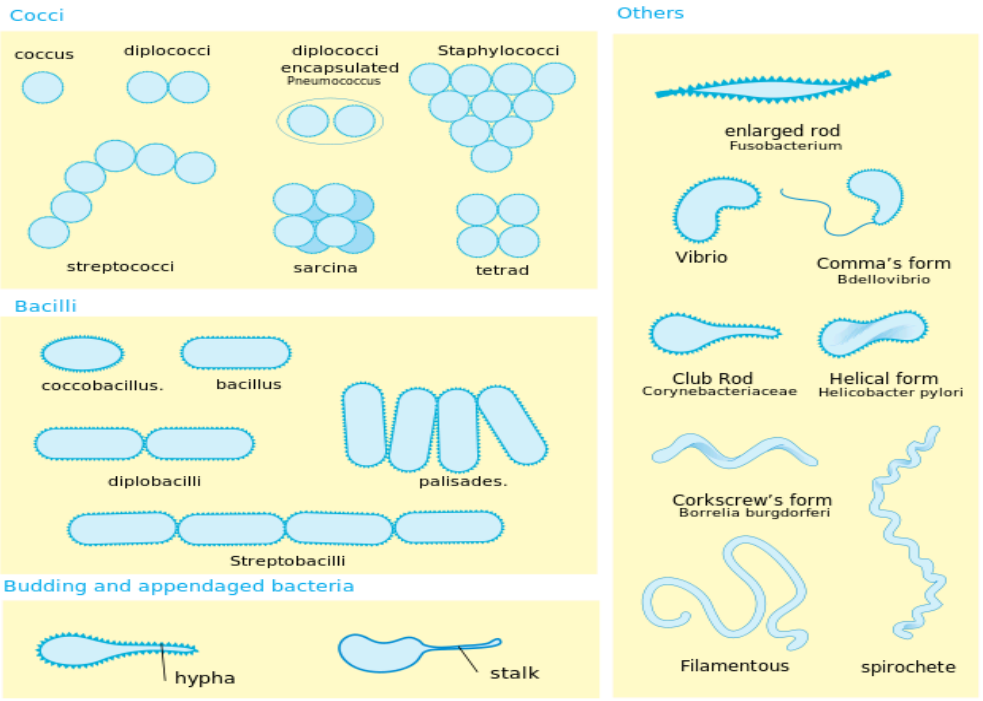
   Spirochaetes- These **are also s**piral in shape but are more flexible and slenderer with helically coiled structure e.g *Treponemapallidum* which causes syphilis.

   Vibrios- These are comma-shaped bacteria e.g *Vibriocholera* which causes cholera.

2. **VIRUSES:** Viruses are a large group of pathogens whose presence is felt only when they are in contact with living cells. They are very small and vary between 0.1μ-0.25 μ in diameter. The largest virus is less than one-fourth the size of typhoid bacterium.

A virus consists of a nuclear material either DNA or RNA, enclosed within a protein coat. Outside living organisms they are like complex chemicals.

3. **PROTISTS:** These are single-celled animals, mostofwhich are only visible by means of microscope. They are common in fresh water and moist soils. Examples include *Euglena, Paramecium, Trypanosoma, Plasmodium,* etc.
4. **FUNGI:** They are diversified in form. The blue and green growth on oranges, lemons, cheese and the white/grey growth on bread are usually signs of fungal infections. Fungi feed saprophytically. Examples of fungi include *Mucor, Rhizopus, Penicillium, Aspergillus*, etc.
5. **ALGAE**: Most algae are unicellular and very small. They have chlorophyll. They occur abundantly in water, moist soils, bark of trees, stones, etc. Free floating microscopic algae are referred to as **phytoplanktons**and they form the major food of aquatic animals. Examples of unicellular algae include *Chlamydomonas and Protococcus.*



Shapes of bacteria

EVALUATION

1. What are microorganisms
2. List five groups of microorganisms with two examples each

CONCEPT OF CULTURING

A pre-requisite to studying microbes is their cultivation under laboratory conditions. Hence, it is important to know the nutrients and physical conditions needed by the organisms.

It is easier to grow bacteria, fungi, and algae in appropriate media. The material on or in which microbes grow in the laboratory is called **culture medium**. Some media are prepared from complex extracts of plant or animal tissues. A culture is the population of organisms cultivated in a medium.

If a culture contains only one living species of organism regardless of the number of individuals, it is said to be a **pure** or **axenic culture**. A culture which contains two or more species growing together is called a **mixed culture**.

An important medium used for growing microbes is **agar.** It is a dried polysaccharide extract of red algae which is used as a solidifying agent. It is not broken down by microbes.

EVALUATION

1. What is a culture medium?
2. Differentiate between axenic and mixed culture

IDENTIFICATION OF MICRO-ORGANISMS

There are many ways of identifying micro-organisms around us. These include the use of microscopes stains of different types, types of colonies formed by the microbes, their food requirement and oxygen requirement of the organisms.

To determine the presence of microbes around us, suitable media are used to culture them in petri-dishes which are first sterilized by heating them in a pressure cooker, autoclave or oven.

Micro-organisms are not capable of growing in the air. The exposure of nutrient agar to the air will show the growth of different bacteria colonies in the air. Microbes commonly found in the air include viruses, bacteria, fungi, etc.

Microbes in aquatic habitat may be grouped into **natural water, soil and sewage microbes**. Examples of the first category include protists, algae, some fungi,bacteria, etc. Examples of the second group include *Rhizobium*, *Nitrosomonas*, and *Nitrobacter*. Examples of sewage microbes are *Entamoebahistolytica*, *Escherichia coli, etc.*

Microbes living in our bodies form normal population without causing any harm. However, under certain conditions, they may become dangerous. Pathogenic organisms cause diseases when body resistance is low or when normal microflora is de-established by the use of antibiotics. Any food item left unpreserved for a long time will be spoilt by the activities of microbes.

Pathogens enter the body through four main ways, namely: **air, food and water, contact** (direct or indirect), and **insect bites/cuts**.

EVALUATION

1. Give two examples each of soil and sewage microorganisms
2. List four ways through which microorganisms enter the body

CARRIERS OF MICROORGANISM

Any agent that carries microbes from one place to another is called a carrier. Carriers can be living or non-living things. Non-living carriers include air, water, and food while animals (e.g. houseflies, mosquitoes, rats, cats, etc) are the living carriers. Animal vectors carry pathogens either mechanically or biologically. In mechanical method, animals carry the pathogens on their bodies where they cannot grow or multiply. In biological method, the vector becomes infected by feeding on the body fluid of infected persons or animals.

Vector or Carrier	Micro-organisms	Disease caused
(i) Anopheles (female) mosquito	Plasmodium	Malaria fever
(ii) Tse-tse fly	Trypanosome	Sleeping sickness
(iii) Housefly	Vibro cholera	Cholera and typhoid fever
(iv) Aedes mosquito	Virus	Yellow fever

EVALUATION

1. What are vectors
2. Mention two ways by which animal vectors carry pathogens.
3. Explain each of the method described above

GENERAL EVALUATION

1. Give two examples each of the following microorganisms (i) fungi (ii) Bacteria (iii) Algae (iv) Protozoa
2. What do you understand by the word 'agar'
3. Describe ways by which microorganisms can be transmitted
4. State the vectors and the diseases caused by the following organisms (i) plasmodium (ii) trypanosome (iii) vibro-cholerea

READING ASSIGNMENT: College Biology, chapter 21, page 465 – 484

WEEKEND ASSIGNMENT

1. When bacteria are arranged in chains, they are called (a) spirilla(b) staphylococci (c) streptococci (d) bacilli
2. Viruses are considered to be living organisms because they (a) possess transmittable characters (b) move from one place to another (c) respond to stimulation (d) ingest food materials
3. Which of the following is not a protozoan? (a) paramecium (b) plasmodium (c) penicillium (d) *Amoeba*

4. Which of the following best describes a culture solution? (a) A population of micro-organisms cultivated in a medium (b) A population of weeds cultivated in a medium (c) Solution containing different chemicals (d) Solution containing dead organisms
5. Which of the following organisms is not a fungus? (a) Rhizopus (b) Plasmodium (c) Mucor (d) Aspergillus

THEORY

1. Differentiate between pathogens and vectors
2. Describe the structure of a virus

WEEK TWO **DATE: .....**

MICRO-ORGANISMS IN ACTION

CONTENT

- Growth of Microorganisms
- Beneficial and Harmful Effects of Microorganisms
- Diseases Caused by Microorganisms, Symptoms, Mode of Transmission and Control

GROWTH OF MICRO-ORGANISMS

Bacteria reproduce by binary fission in which a single cell divides into two. This process is called asexual reproduction. The time interval required for the cell to divide into two is called **generation time.** This time varies from one organism to another. It strongly depends upon nutrient availability, temperature, gaseous requirement and pH. There are different phases in the growth of bac**t**eria. These include the (i) lag phase (ii) logarithmic or exponential phase (iii) the stationary phase and (iv) decline or death. The growth of micro-organisms can be measured by using any of these methods:

(a) Turbidity method.
(b) Serial dilution method.
(c) Squared transparent paper or cellophane method.

EVALUATION

1. State four factors that can affect the growth of microorganisms.

2. List three ways of measuring the growth of bacteria.

BENEFICIAL AND HARMFUL EFFECTS OF MICRO-ORGANISMS

BENEFICIAL EFFECTS

1. Bacteria help to digest cellulose in herbivores.
2. In man, they synthesize vitamin K and B_{12}
3. Bacteria and fungi are widely used in the synthesis of antibiotics
4. They are used to manufacture amino acids and vinegar
5. Bacteria are used to process milk into different tastes and flavours
6. They are used to decompose sewage into harmless inorganic compounds.
7. Microbial cultures are used to produce enzymes
8. Yeast is used as a leavening agent in baking industries.
9. Algae play important role in fertilizing the soil.
10. Bacteria are used to produce single-cells protein (SCP).

HARMFUL EFFECTS

1. Bacteria cause decay and spoilage of food items.
2. Materials like wood, paper, textiles, rubber and metals are destroyed by microbes.
3. They cause diseases of different types.

EVALUATION

1. State thee beneficial and three harmful effects of microorganisms.
2. Mention five mention five beneficial and five harmful microorganisms.

DISEASES CAUSED BY MICRO-ORGANISMS

DISEASE	CAUSATIVE AGENT	SYMPTOMS	TRANSMISSION	CONTROL
Chickenpox	*Varicella Virus*	Fever, tiredness, and an itchy, blistery rash.	Contact	Isolate patient and use appropriate drugs.
Cholera	*Vibrio Cholerae*	Watery diarrhea, vomiting, leg cramps.	flies, food , faeces, carriers	Personal hygiene.
Common Cold	*Rhino Virus*	Cough, runny nose, shivering, etc.	Contact	Take appropriate medications and avoid contact.
Dengue	*Dengue Virus (arbovirus)*	Severe headache, severe eye pain (behind eyes), joint pain, muscle and/or bone pain, rash, mild bleeding (e.g., nose or gum bleed,	Aedes Mosquito	Drain the water and clear the bushes around.

		petechiae, or easy bruising),low white cell count.		
Diarrhoea	*Giardia intestinalis*	Frequent passing of watery faeces, cramps and pains in the abdomen (stomach), nausea and vomiting.	contaminated stools	Personal hygiene
Diphtheria	*Corynebacteriumdiptheriae (Bacteria)*	A sore throat, hoarseness, painful swallowing, swollen glands (enlarged lymph nodes) in your neck, thick, difficulty breathing or rapid breathing, nasal discharge, fever and chills, & malaise.	Contact	Use antibiotics and avoid contacts.
Leprosy	*Mycobacterium leprae*	Disfiguring skin sores, lumps, or bumps (that do not go away after several weeks or months), loss of feeling in the arms and legs, muscle weakness.	Long and close contact	Use antibiotics and avoid contacts. Patients should be isolated.
Measles	*Measles virus (ParaMyxoVirus)*	A high temperature, sore eyes (conjunctivitis), runny nose, small white spots, harsh dry cough, going off food, tiredness, aches, pains, diarrhoea and/or vomiting.	Contact	Take appropriate medication and avoid contact.
Pneumonia	*Diplococcus pneumonia*	High fever, shaking chills, cough with phlegm (a slimy substance) which doesn't improve or worsens, shortness of breath, chest pain when you breathe or cough, suddenly feeling worse after a cold, etc.	bacteria transmission by contact.	Use of antibiotics and avoidance of contact.
Poliomyelitis	*Polio Virus or Enterovirus*	Fever, sore throat, headache, vomiting, fatigue, back pain or stiffness, neck pain or stiffness, pain or stiffness in the arms or legs, muscle weakness or tenderness, & meningitis.	houseflies, food and water	Good hygiene and appropriate medication.
Rabies	*Rhabdovirus*	Fever, cough, sore throat, etc.	mad dog bites	Treat dogs and seek urgent medical attention in cases of bites.
Septic Sore Throat	*Streptococcus Bacteria*	Fever, nasal drainage, ***sore throat***, swollen glands, difficulty swallowing, and irritability.	Contact	Use of antibiotics and avoidance of contact.
Sleeping Sickness	*TryponosomaBrucei*	Anxiety, drowsiness during the day, fever, headache, insomnia at night, mood changes, sleepiness, sweating, swollen lymph nodes all over the body, swollen, red, painful nodule at site of fly bite.	reaches lymph nodes via transmission thru fly bites	Clear vegetations around, use insecticides and take appropriate medication.

Smallpox	*Variola Virus*	High fever, vomiting, fatigue, backache, a raised spotted rash, etc.	Contact	Take appropriate medication and avoid contact.
Tuberculosis	*Mycobacterium tuberculosis*	Malaise, weight loss, and night sweats.	Bacteria transmission by cough	Isolate patients and use appropriate antibiotics.
Tetanus	*Clostridium tetani*	Muscle spasms and breathing problems.	bacteria in soil thru wounds	Treat wounds urgently.
Typhoid	*Salmonella Typhi*	Abdominal tenderness, agitation, bloody stools, chills,confusion, difficulty paying attention, fluctuating mood,nosebleeds,severe fatigue,weakness, etc.	Flies, food etc.	Treat water before drinking. Maintain personal hygiene. Use appropriate antibiotics.
Whooping cough	*Hameophilius Pertussis*	Cough, whooping sound during breathing, etc.	coughing and sneezing	Isolate patients and use appropriate antibiotics.
Influenza Flu	*Orthomixovirus*	fever and muscle aches, cold, runny nose, sore throat, etc.	Contact	Take appropriate medication and avoid contact.
Malaria	*Plasmodium*	chills, headache,muscle aches, tiredness, nausea, vomiting and diarrhea.	Bite from female *Anophelex* mosquitoes	Use of drugs, insecticides, etc.

EVALUATION

1. State the causative organisms, symptoms and control of the following diseases (i) Malaria (ii) Cholera (iii) Tuberculosis (iv) Measles (v) Poliomyelities
2. List five airborne and waterborne microorganisms respectively.

GENERAL EVALUATION

1. Mention the observable phases in the growth of microbes.
2. State five uses of microorganisms in industries.
3. Outline four general ways of controlling microorganisms.
4. Mention three microorganisms each that are involved in Nitrogen and Carbon cycle.
5. State three uses of microorganisms in (i) Agriculture (i) Medicine
6. Describe three ways of measuring growth of bacteria.
7. List five ways through which microorganisms can be transmitted.

READING ASSIGNMENT: College Biology, chapter 21, page 467 - 484.

WEEKEND ASSSIGNMENT

1. The growth phase in bacteria in which cells divide steadily at a constant rate is called (a) Exponential phase (b) lag phase (c) stationary phase (d) decline phase
2. Which of the following microbes causes cholera? (a) Virus (b)Bacterium (c) Protozoan (d) Fungus
3. Growth of micro-organisms can be measured by the following methods except_____ method (a) serial dilution (b) turbidity (c) squared transparent paper (d) dry weight

4. The following practices contribute to the control of the spread of diseases except (a) sewage treatment with chemicals (b) proper sewage disposal (c) disinfecting the surrounding (d) using human faeces as manure
5. The vector of the trypanosome parasite is (a) housefly (b) tse-tse fly (c) mosquito (d) black fly

THEORY

1. Define the following phases in microorganisms growth (i) lag (ii) exponential (iii) stationary.
2. State four ways in which each of the following organisms are beneficial to humans.
   i. Bacteria ii. Fungi

WEEK SEVEN **DATE .....**

SEXUALLY TRANSMITTED INFECTIONS

CONTENT

- Definition, Mode of Transmission, Symptoms, Prevention and Control
- HIV and AIDS

Sexually Transmitted Infections (STIs) (veneral diseases) are the diseases that are contacted through sexual intercourse. Examples include syphilis, gonorrhea, herpes, thrush, AIDSetc.The table below shows a list of STIs, their symptoms, transmission, etc.

DISEASE	CAUSATIVE ORGANISM	SYMPTOMS	PREVENTION/CONTROL
GONORRHOEA	Bacterium (Neisseria gonorrhea)	− Burning sensation during urination in males − A thick yellowish discharge in males − Pain on passing urine in females − Vagina discharge and swelling of the vulva − Redness around the urinary openings − Sterility at advanced stage	− Discourage commercialized prostitution − Avoid multiple sexual partners − Get medical attention and stop sexual intercourse with previous partner(s)
SYPHILIS	Bacterium (Treponemapallidium)	− A small painless sore appear on the penis or vulva at the initial stage	As in gonorrhoea

		– Fever, skin rashes, mouth ulcer, aching pains at the lymph node regions at secondary stage – Nervous disorder, insanity, repeated abortion etc.	
Acquired immunue deficiency syndrome (AIDS)	Human **immune** – deficiency virus (HIV)	– Fever, chronic diarrhea – Excessive weight loss – General skin irritation – Swelling of the glands – Persistent cough – Persistent severe fatigued	– Keep one faithful partner – Avoid sharing sharp objects such as razor blade, – Screening of blood before transfusion – Avoid oral, anal sex and kissing – National mass campaign to educate people on the danger of HIV
Genital warts	Human papillomavirus (HPV)	– Painless, flesh coloured bumps/warts develop on the penis, in and around the vagina and the anus and may re-appear at different times. – Cervical cancer	– Vaccine available for women aged 9 -26. – sharing personal items, including towels, razors, bars of soap, footwear, or other objects

HIV AND AIDS

HIV (Acquired immune deficiency virus) is the pathogen that caused AIDS, a sexually transmitted disease. **AIDS** is a disease in which the immune system of the human body is completely broken down, rendering the body unable to fight against any pathogens that attack it.HIV belong to a group of RNA virus referred to as retro – viruses. They are capable of converting their RNA to DNA; they attack, infect and destroy certain white blood cells called **helper T cells or CD4 (lymphocytes).**

HIV can remain dormant in the cell of the host for years and multiplying as the cells of the host divide, eventually the virus becomes active producing many viruses causing the killing of the helper T cells. Once the body looses too many helper T cells, the body's defense against infections crumbles and the body becomes vulnerable to various disease pathogens causing various opportunistic diseases.

MODE OF TRANSMISSION

Apart from sexual intercourse, HIV can be transmitted through

a. Receiving blood transfusion from an infected person
b. Infection through pregnancy, child birth and breast feeding
c. Using unsterilized infected needles and syringes
d. By practicing oral and anal sex

e. Open mouth kiss with an infected person

EVALUATION

1. Mention five sexually transmitted diseases
2. State the causative organisms of the diseases mentioned above.

GENERALEVALUATION/REVISIONAL QUESTIONS

1. Mention five beneficial and five harmful effects of microorganisms.
2. In a tabular form, state causal agent and symptoms of five bacterial diseases.
3. State three airborne diseases and their symptoms.
4. What are sexually transmitted infections?
5. State five STIs, their causal agent, mode of transmission and symptoms.

READING ASSIGNMENT: College Biology, chapter 21, page 469 - 472

WEEKEND ASSSIGNMENT

1. The following diseases are caused by bacteria except (a) gonorrhea (b) AIDS (c) syphilis (d) none of the above
2. A disease characterized by high fevers, loss of weight, chronic diarrhea, wasting away and final death is (a) gonorrhoea (b) AIDS (c) syphilis (d) none of the above
3. Which of the following is not a sexually transmitted disease? (a) gonorrhea (b) malaria (c) syphilis (d) AIDS
4. Which of the following statements is wrong? (a) All STIs are caused by viruses (b) All STIs are caused by bacteria (c) All STIs are caused by protozoans (d) All of the above
5. A disease which displays symptoms which are similar to the symptoms of other diseases is (a) syphilis (b) malaria (c) river blindness (d) none of the above

THEORY

1. State the causative organisms, five modes of infection and five ways of controlling AIDS.
2. Differentiate between HIV and AIDS.

WEEK FOUR **DATE .....**

TOWARDS BETTER HEALTH

CONTENT

- Control of HarmfulMicroorganisms.
- Definition and Ways of ControllingVectors.

- Maintenance of GoodHealth.
- Roles of HealthOrganizations.

CONTROL OF HARMFUL MICRO-ORGANISMS

The control of harmful microbes include removal, inhibition of growth or killing by physical agents/processes and chemical agents or antibiotics. Some common methods of controlling harmful microorganisms in order to maintain good health include

1. **High and low temperature:** Boiling or heating of food, pasteurization of milk, sterilization of medical instruments and freezing of food to reduce the activities of microbes to barest minimum.
2. **Covering of food** to prevent vectors and pathogens in the air from coming in contact with the food.
3. **Antibiotics** such as amphiclox, ampicillin, penicillin, tetraclycline, are drugs used to kill many bacteria causing diseases.
4. **Antiseptic** such as dettol, Milton, chlorine water, medicated soap and hydrogen peroxide destroy micro-organisms while others prevent the multiplication of the micro-organisms.
5. **Disinfectants** are stronger antiseptic. Examples are sanitas, Lysol and izal. They are used to disinfect hospitals warehouses and public buildings. Antiseptics and disinfectant have to be diluted to render them gentle or mild to the skin
6. **High salinity (salting):** Salt is used to preserve food. When salt is applied to food items like fresh meat or fish, the micro-organisms are destroyed. The bacterial cells are plasmolysed due to the movement of water from the cells of the bacteria.
7. **Dehydration**: When foodstuffs such as fish and meat are dried, micro-organisms cannot thrive on them. Bacteria need water to survive. So dehydration prevents the survival of micro-organisms.
8. **Sanitation:** Keeping the body and the environment clean.
9. **Isolation of infected persons:** Persons suffering from infectious diseases such as tuberculosis and cholera must be isolated so as to prevent the spread of such diseases to other members of the community.
10. **Balanced diet:** Eating balanced diet everyday helps to promote good health and high body resistance to diseases.

EVALUTION

1. Describe five ways of controlling harmful microorganisms.
2. What method is most effective in microbial control.

VECTORS AND WAYS OF CONTROLLING VECTORS

A vector is an animal which transmits disease-causing organisms (pathogens) from the victim of that disease to another person.

Control of mosquitoes

- Draining of swamps
- Clearing of bushes around houses
- Sleeping in a room protected by mosquito net.
- Spray swamps or rooms with insecticides.
- Spray oil on stagnant water.
- Using insect repellant on body.
- Use of drugs
- Burying broken pots and cans.

Control of Houseflies

- Spraying with insecticides
- Destruction of breeding spots
- Use of poison baits
- Closing of pit toilets
- Covering of food
- Keeping environment clean.

EVALUATION

1. List four ways each of controlling black fly, tse-tse fly and rodents
2. Explain other ways mosquitoes can be control.

MAINTAINANCE OF GOOD HEALTH

There are many ways of maintaining good health. These include:

a. Refuse disposal: Refuse are solid waste materials discharged through human activities from homes and industries into the environment. Reckless refuse dump around dwelling places creates bad odour, provides breeding grounds for insects and rodents that spread diseases. Refuse disposal can be done through the following ways; Provision of dust bins in strategic locations, Burning of refuse in incinerators, Dumping them in isolated areas far from human habitation, Burying refuse in sanitary landfill.

b. Sewage disposal: Sewage are waste water materials discharged from laundries, kitchen, toilets, bathrooms e.g. urine and faeces. Sewage disposal is done through the use of pit toilets where faeces and urine are passed into deep pits,the use of septic tanks where water is used to flush faeces and urine into a big tank dug in the ground, community treatment process where sewage from various homes are collected and treated before being discharged into the oceans or rivers.

c. Protection of water: In view of various diseases which man contact because of drinking unclean water, water should be protected through the following ways: addition of alum to water, boiling of water before drinking, filtration of water on cooling, addition of chlorine to kill microscopic germs,storage of water in clean containers.

d. Protection of food: The following methods of food protection are recommended: Keep food in refrigerators or deep freezers, boil or cook raw food properly before eating, there should be inspection of food meant for public consumption, washing of hands before and after eating of food, food should be preserved through canning, keep the environment where the food is prepared clean, avoid exposure of food to flies and other micro-organism.

EVALUATION

1. State four ways of purification of water
2. Differentiate between refuse and sewage

ROLES OF HEALTH ORGANIZATIONS

The administration of health services in Nigeria is achieved through the following approved organizations:

a. Ministry of Health
b. University Teaching Hospitals

Countries cooperate to tackle health issues. At international level, health control is organized top prevent the spread of diseases and also to provide aid to needy areas. This can be in the form of drugs, medical equipments, money, etc.

International Health Organizations include: World Health Organization (WHO), United Nations Children's Fund (UNICEF), International Red Cross (IRC), United Nations Educational, Scientific and Cultural Organization (UNESCO).

World Health Organization (WHO)

This is the world's principal agency for dealing with health and nutritional problems. It was established in 1964 and became operational in 1948. The functions of WHO are as follows:

(i) It provides and assists national governments at their request to strengthen their health services.
(ii) It promotes and provides improved methods of training health, medical related professional experts for member countries.
(iii) It promotes cooperation among scientific and professional bodies for the improvement of health.
(iv) It cooperates with other organizations in the improvement of nutrition, sanitation, housing working conditions and other matters that relate to health.
(v) It helps and promotes material and children's health care and welfare.
(vi) It produces medical publications.
(vii) It provides drugs and vaccines in cases of emergency

United Nations Children's Fund (UNICEF)

This is a body set up by the U.N. It performs the following functions:

(i) It provides emergency needs for children in areas affected by diseases or famine.
(ii) It improves the nutritional condition of undernourished children.
(iii) It feeds and cares for disabled children.
(iv) It undertakes immunization programmes for children's diseases like measles, whooping cough, etc.
(v) It ensures the provision of clothing and other needs for children

International Red Cross

This is a humanitarian organization whose functions are to serve humanity during peace and war times. During war, it performs the following functions:

(i) Care for the injured.
(ii) Provision of emergency aid.
(iii) Negotiating for the exchange of the prisoners of war.
(iv) Evacuation of refugees.
(v) Welfare of war prisoners.

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Although, this is not directly a health organization, it assists health services indirectly by raising the educational standards of the people in developing countries.

EVALUATION

1. List three Health organization and outline four roles of each.
2. Write short note on the life cycle of plasmodium.

GENERAL EVALUATION

1. State five roles of UNICEF as a health organization
2. State five roles of World Health Organization
3. What is pasteurization?
4. What is quarantine?
5. Outline four general methods of controlling vectors

READING ASSIGNMENT: College Biology, chapter 22, page 485 - 495.

WEEKEND ASSSIGNMENT

1. A way of providing good health in a community is (a) control of diseases (b) sewage disposal (c) refuse disposal (d) all of the above
2. Which of these is not a vector? (a) Black fly (b) Snake (c) Dog (d) Housefly
3. The process of heating liquid food at a controlled temperature thereby enhancing its quality and destroying harmful micro-organisms (a) Pasteurization (b) Boiling (c) Frying (d) None of the above

4. An agent that stops the growth of fungi is called (a) fungistat (b) fungicide (c) germicide (d) none of the above
5. The process by which water is removed from bacteria cells which leads to the cell been plasmolysed is referred to as (a) drying (b) salting (c) dehydration (d) pasteurization

THEORY

1. Name the causative organism and vector of Malaria
2. List five symptoms of Malaria
3. Mention five ways by which mosquito can be control and state the reason for each method

WEEK FIVE DATE .....

RELEVANCE OF BIOLOGY TO AGRICULTURE

CONTENT

- Classification of plants
- Botanical classification
- Agricultural Classification
- Classification based on life cycle
- Classification based on size
- Effects of agricultural practices on ecological systems

CLASSIFICATION OF PLANTS

Plants exists in various forms and types hence, the need for classification. Plants can be classified on the following bases

i. Botanical classification

ii. Agricultural classification

iii. Classification based on life cycle

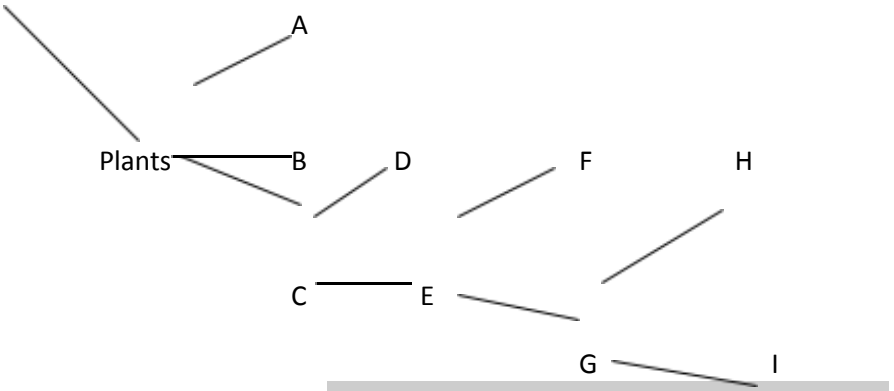
iv. Classification based on size

BOTANICAL CLASSIFICATION

The concept of binomial nomenclature has it that plant kingdom can be subdivided into divisions, classes, orders, families, general and species. This is based on their structures, functions and evolutionary trends. Plants are then generally classified into three brand groups

(i) Thallophytes (A)
(ii) Bryophytes (B)
(iii) Tracheophytes (C)

Tracheophytes are further grouped into pteridophytes (D) and spermatophytes (E). The Spermatophytes can also be grouped into gymnosperms (F) and angiosperms (G). The angiosperms are subdivided into dicot (H) and Monocot (I)



BOTANICAL CLASSIFICATION CHARTS

A & B are non- vascular plants, C refers to vascular plants. D refers to non-flowering plants; E refers to seed plants while G refers to flowering plants proper.

EVALUATION

1. Outline the criteria (bases) for classifying plants
2. List the three factors upon which botanical classification is based

AGRICULTURAL CLASSIFICATION

Agricultural classification of plants is based on:.

i. The product obtained from the plants

ii. The parts of the plant that is useful

iii. The economic importance of the plants

Plants are therefore classified agriculturally into the following

1. **CROPS AND WEEDS**: - plants that are needed on the farm are called crops while other unwanted are called weeds.

2. **FOOD CROPS AND CASH CROPS**: - crops grown mainly for human consumption are called food crops e.g. maize, yam etc. Those grown mainly to earn money are cash crops e.g. cocoa, coffee
3. **ROOT CROPS**: - are plants which store mainly starch in edible underground stems or roots e.g. yam, cassava etc.
4. **CEREAL CROPS**: - these are monocotyledonous plants of grass family, whose grains are eaten e.g. maize, millet, guinea corn, rice, wheat, etc. They are rich in carbohydrates.
5. **FRUITS CROPS**:- are rich in vitamins and minerals. Fruits are also rich in sugar. These include oranges, mangoes, avocado peers, cashew etc. whose fruits are eaten
6. **VEGETABLE CROPS**: - are herbaceous plants whose vegetable (leafy) parts are eaten. They include spinach, lettuce, carrots, cabbage, okro, tomato, onion, pepper etc. They are also rich in vitamins and minerals.
7. **LEGUMES**: - are plants of beans family such as cowpea and groundnuts whose seeds are eaten. They are rich in proteins
8. **SPICES:** Are plants whose parts are used for seasoning food such as pepper, curry, thyme and ginger.
9. **LATEX PLANTS**: Are plants that are grown for their useful latex (a milky fluid) e.g. rubber plants used for making natural rubber in the tropical countries
10. **FIBRE PLANTS**: Are plants which produce fibre for the purpose of rope making, textile and bags production e.g. cotton, hemp etc.
11. **BEVERAGE AND DRUG PLANTS**: - Are plants whose parts are taken as stimulants or drugs e.g. tea, coffee, cocoa and kola nut, quinine tree for medicine.
12. **OIL PLANT: -** Produce oil of economic value e.g. oil palm, sheanut, groundnut, coconut, castor oil plant and melon.

EVALUATION:

1. What are the factors considered in agricultural classification of plants?
2. Differentiate between fruits crops and vegetable crops

PLANT CLASSIFICATION BASED ON LIFE CYCLE AND SIZE

Based on life cycle (period or existence) plant can be classified as

a. ANNUALS: - These are plants which complete their life cycle within one growing season or within a year e.g. Maize, Yam, Melon, cowpea, tomato etc.
b. BIENIALS: - These complete their life cycle within two years e.g. Banana, plantain, pineapple etc.
c. PERENNIALS: - These persist over (more than) two years producing their yields every season e.g. orange, mango, oil palm cocoa etc.

Plant based on size fall into three categories

1. Herbs are small plants with fleshy stem e.g. Spinach, waterleaf etc.

2. Shrubs are medium – sized plants with woody stem branch very close to the ground (soil) e.g. hibiscus
3. Trees are big plants with woody trunk, which branch at the top e.g. Iroko, Mahogany, Cashew, and Coffee etc.

EVALUATION

1. Classify the following plants based on their life cycle (a) Vegetable (b) Pineapple (c) almond tree
2. Give two examples each of herbs, shrubs and tree crops

EFFECTS OF AGRICULTURAL ACTIVITIES ON ECOLOGICAL SYSTEM

The following agricultural or farming practices carried out by farmers have some consequences on the ecological system. These agricultural practices and their effects include;

a. **Bush Burning:** Bush burning involves the setting of fire in the bush to clear out the vegetation.Effects of bush burning include
   - Destruction of the organic matter in the soil
   - Atmosphere is polluted with smoke.
   - Many of the micro-organisms are killed
   - exposes the soil to erosion and leaching
   - reduces the water holding capacity of the soil
   - Bush burning leads to the extinction of some animals
   - The ash produced by bush burning gives the soil a slightly alkaline nature
b. **Overgrazing:** Overgrazing is a situation where more animals than what can be supported on a particular pasture are put there to graze. It is a way of exceeding the carrying capacity of the soil. Overgrazing
   - removes the vegetative cover of the soil
   - exposes the soil to erosion
   - destroys the soil structure
   - More faeces are dropped on the soil which could improve the fertility of the soil.
   - Weeds can eradicated from such lands
   - It leads to compactness of the soil resulting from continuous trampling of animals.
   - causes poor growth and regenerative capacity of vegetation
c. **Tillage:** Tillage is defined as the working, digging or breaking up of the soil in preparation for the planting of crops. Tillage encourages leaching
   - helps to loosen the soil
   - it enhances proper aeration of the soil
   - tillage exposes the soil organisms and may kill some
   - it changes the structure and texture of the soil
   - tillage leads to changes in the ecology of the land

- Intensive tillage can lead to loss of soil fertility.
- It exposes the soil to erosion.

d. Deforestation: Deforestation is the continuous removal of forest stand (trees) either by bush burning or indiscriminate felling without replacing them. Deforestation

- It reduces water percolation due to absence of humus and dead leaves on the soil
- It reduces the amount of rainfall in the area
- Deforestation hinders micro-organisms activities in the soil
- It results in loss of nutrients through leaching and erosion
- It reduces wildlife population in the area concerned
- It reduces the humus content of the soil

e. Fertilizer application: This involves the application of certain chemicals or substances into the soil to improve its fertility. Effects of fertilizer application include

- It brings about the loss of organic matter or humus
- It deteriorates the structure of the soil
- Fertilizer increases the porosity of the soil
- It supplements nutrient content of the soil
- Excessive application of fertilizer can cause soil acidity
- The productive capacity of the soil is enhanced by the application of fertilizer
- It stimulates vegetative growth, hence it reduces soil erosion

f. Application of pesticides/herbicides: Pesticides are chemical substances which are used to destroy or kill pests while herbicides are also chemical substances in form of solution or gases capable of destroying weeds. Effects of pesticides application include

- It causes pollution of the environment.
- It affects or destroys other useful plants and animals.
- It reduces the population of the target insects or plants.
- Pesticides may leave undesirable residue in the environment.
- When such chemicals are washed into rivers or lakes, they can cause death of aquatic animals.

EVALUATION

1. State three effects of fertilizer application, tillage and bush burning on the ecosystem.
2. Explain with reason the most ecologically friendly agricultural practice.

GENERAL EVALUATION

1. Based on size, classify water leaf, hibiscus and oil palm
2. Differentiate between shrubs and trees
3. Discuss the botanical classification (using example where appropriate)
4. In what ways are fruits and vegetable crops similar
5. Differentiate between root and cereals crops
6. Differentiate between annual and perennial crops giving two examples each.

WEEKEND ASSIGNMENT

1. Which of the following is not an example of classification of plants (a) Herbs and shrubs (b) annual and perennials (c) Graminae and enphorbinosae (d) monocot and dicot
2. Plants can be classified based on all these except (a) botanical (b) size (c) agricultural use (d) planting season
3. Fruits crops are rich in (a) Vitamin and Minerals (b) Vitamins and protein (c) Mineral and carbohydrate (d) protein and carbohydrate
4. Spices include (a) Pepper and ginger (b) Palm oil and ginger (c) Lettuce and carrot (d) yam and maize
5. Which of these does not have negative effect on the ecological system (a) fertilizer application (b) crop rotation (c) tillage (d) bush burning

THEORY

1. State three effects each of the following farm practices on the ecosystem

(i) Bush clearing
(ii) Shifting cultivation
(iii) monocropping

What are the classes of plants based on uses.

WEEK SIX& SEVEN

PEST AND DISEASES OF CROPS AND LIVESTOCK

CONTENT

- Definition
- Group of Crop Pests
- Life Cycle of Selected Pests
- Pests of Crops, Effects and Control
- Pests of Livestock, Effects and Control
- Economic Importance of Pests
- Diseases of Crops, Effects and Control
- Livestock Diseases, Effects and Control
- General Effects of Pests and Diseases (Economic Importance)
- Prevention and Control of Pests & Diseases

DEFINITION

A pest is an organism which harbors disease organism(s) or causes damage to other organism(s). There are crop and livestock (animals) pests. Crop pests include insects such as grasshoppers, mealy bugs, myriads, beetles, birds and mammals (such as rodents) while livestock pests are ectoparasites such as ticks, mites and endoparasites such as liver flukes, round worms and tapeworms. They can also be plant pests known as weeds or animal pests such as insects, birds, rodents, monkeys, man or nematodes.

TYPES OF PEST

Insects pest: These are arthropods that carry diseases or cause damage to plant and animals. Examples include: tick, lice, grasshoppers, cotton stainer etc.

Non insect pest: These are vertebrates and molluscs that common cause disease to plants and animals or destroy crops. E.g rodents, worms, nematodes, monkeys etc.

GROUPS OF INSECT CROP PESTS

Stem Borers: Stem borers of cereal crops like maize are the larvae of certain moths. They lay eggs at the junctions of leaf sheaths and stem of a maize plant which hatches after a week and weakens the stem causing the maize plant to break even in slight wind.

Fruit and Seed Feeders: These include fruit-piercing moths, fruit flies, cotton strainers and certain beetles. Examples are red boil-worm and the cotton stainer. Their host plant includes tomato, millet, maize and okra.

Root Feeders: They may be insect larvae or adults. An example is the yam beetle which lives mainly in the soil. They burrow into the ground and feed on yam tubers.

Leaf Feeders: Leaves of crops are eaten by snails, leaf-feeding beetles, caterpillars of various moths and butterflies, grasshoppers and locusts.

Young Shoot Feeders: Insects like aphids and mealy bug pierce and suck juices from young shoots of crop plants. They first settle on the apex and feed on the young tissue. Many sucking pests also transmit disease-causing fungi, bacteria, and virus to the plants e.g. cassava mosaic transmitted by white flies.

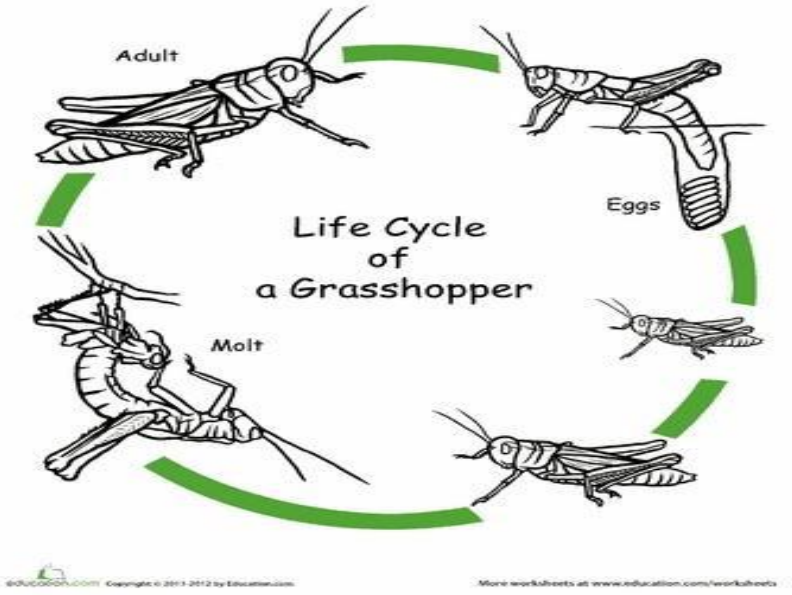
Life Cycle of Some Selected Pest

Grasshopper*(Zonocerus variegates)*

History: Male and female mate and eggs are then fertilized internally. The female then digs a hole with her ovipositor in the soil usually near the roots of plants and lays about 40 to 100 eggs the hole. A protective material is produced to cover the eggs. After about 3 days, the eggs hatch into nymphs. A nymph resembles the adult in all respect except it is sexually immature and wingless. The nymph moults several times and hops about feeding on the shoots of plants

nearby. They begin to migrate into areas where there are cassava farms and start feeding on the cassava leaves until an adult stage is attained.

LIFE CYCLE OF A GRASSHOPPER



Effects of Grasshoppers on Cassava

Nymphs and adults feed on the leaves, shoots and barks of cassava thereby reducing cassava yield drastically as photosynthesis is seriously impaired.

Control: Spray with gammalin 20.

Cassava mealy bug (*Phenacoccusmanlhot*)

The female insect lays eggs without fertilization by the male. This type of reproduction is called parthenogenesis. The unfertilized eggs hatch into larvae which are wind borne or carried with cassava stem cuttings during planting because they hide in the buds of the stem. The larvae undergo three moulting stages before adult stage. One generation is completed in about twenty-two days and the adult has life span of about one hundred and forty-five days.

Effects

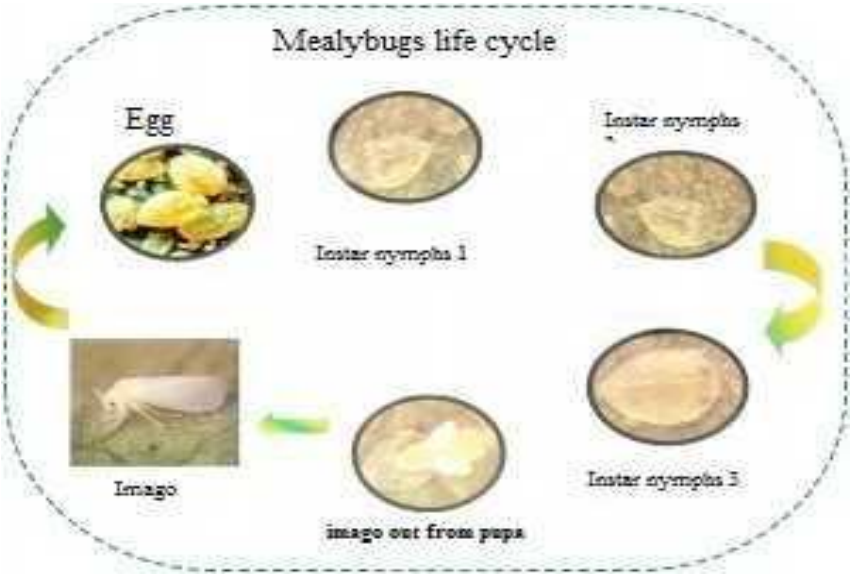
1. They suck the sap of cassava leading to the stunted growth of shoot.
2. The shoots develop bunchy tops.
3. The leaves of the shoot die and drop.
4. Mealybug infestation impairs photosynthesis

Control: Dip cassava cutting in 0.1% ultracide solution for one minute before planting tuber

EVALUATION

1. Describe the life cycle of a grasshopper.
2. What is parthenogenesis?

The Life Cycle of Cassava Mealy bug



Life History of Bean Weevil

Male and female adults mate and fertilized eggs are then laid in the ripening pods in the farm. The eggs hatch into larvae which enter into the bean seeds before harvesting. In the store, the larvae feed on the cotyledons of the beans. The larvae develop into pupae in the store. The pupae later develop into adults which fly away to mate again in the farm.

Effects

The larvae feed on the seed thereby reducing the quality and value of the beans.

Control

Fumigate the store in which beans are stored with fumigants such as methyl bromide.

Cocoa Myriads (Capsid)

These are piercing and sucking insects. They attach the young shoot of cocoa, introducing toxic saliva into the sap which may kill the plant. It can also introduce viral diseases into the plant.

Effects

Cocoa myriads cause die back disease which reduces the growth of cocoa plant. Fruit yield is reduced.

Control

Spray the cocoa farm with kokotine or gammalin 20

Yam Beetle (*Heteroligusmeles*)

Life History

The mating of the female and the male yam beetles takes place between November and December in riverine areas and fertilized eggs are laid. Between December and February, eggs hatch into larvae that feed on the decayed organic substances. The larvae melt thrice before developing into pupae. In March, the pupae develop into adults after moulting. The adults then fly to areas where yams are planted between April and June. They dig into the soil to search for yam tubers. When they eventually come in contact with tubers, they feed on them and seriously damage the tubers. Between October and November, the adult yam beetles undergo breeding migration to the riverine areas again for mating.

Effects

Adult beetles feed on yam tubers causing serious damage to the tubers and render the tubers valueless. If the tubers are attacked at early stage, the yield becomes poor.

Control

Dust yam or yam sets with Aldrin before planting.

Evaluation

1. Describe cocoa myriads as a pest.
2. Suggest a way of controlling yam beetle.

Examples of Pests of Crops, their Effects and Control (Summary)

PESTS	EFFECTS	CONTROL
1. Grasshopper	Nymphs and adults feed on leaves and shoots thereby reducing yield.	Spray with gammalin 20
2. Yam beetle	Adults feed on yam tubers rendering the tubers valueless or causing poor yield	Dust yam or yam sets with aldrin before planting.
3. Cocoa myriads (capsids)	Piercing and sucking insects that attack young shoots of cocoa introducing toxic saliva and viral diseases into the plants. This may kill the plants, reduces the growth and fruit yield.	Spray cocoa farm with kokotine or gammalin 20.
4. Mealy bug	They suck sap of cassava which makes the shoots to develop bunchy tops; the leaves die and drop resulting in low root tubers.	Dig cassava cuttings in 0.1% rogor before planting.
5. Beans weevils	Field to store pests. Larvae feeds on bean seed bore holes into them thereby reducing the quantity and quality of the grains.	Fumigating the store with insecticides and early harvesting.
6. Cotton strainers	Feeds on cotton seeds and stains lint.	Spray suitable insecticides
7. Mammals (monkeys,	Destroy tubers, fruits and shoots of crops by feeding on them.	Trapping, shooting and clearing their hide out by proper weeding.

grass cutter, squirrel)		
8. Birds	Feed on grains, plantains and other crops	Chasing away

Evaluation

1. Discuss four insect pests of crops under the following sub headings: pests and effects.
2. Suggest ways of controlling the mentioned pests in question 1.

PestsandParasitesofLivestockandtheirEffects

A parasite is an organism living in or on another organism called host having a harmful effect on the host as a result of the association. Parasite which lives inside its host is called **endoparasite** e.g. tapeworm, roundworm, liver fluke. Parasite which lives on or outside the host is called **ectoparasite** e.g. ticks, lice and mite.

Examples of Animal Pests, their Effects and Control

SITE		**CTS/ECONOMIC IMPORTANCE**	**TROL**
1. Ticks	goats, sheep	blood which result in anaemia, restlessness, sores on the skin of animals and loss of weight. They also transmit viruses and protozoa that cause diseases	animal houses with insecticides, remove the ticks from the body of the animals
2. Liver fluke (Fasciola hepatica)		are picked up when animals drink water and feed on grasses. The cyst develops into a young fluke which burrows through the wall of the small intestine and liver. This affects digestion; result in liver rot, leading to drowsiness and death.	y water snail, an intermediate host, treat pools with copper sulphate.

3. Round worm (Ascarissuum)	pigs	on digested food from the host which results in slow growth, indigestion and constipation, loss of appetite, weakness & death.	rm animals regularly, good sanitary measure
4. Lice		blood of their hosts resulting in great irritation, restlessness, loss of weight and low productivity. They also transmit disease pathogens.	ıt over crowding, good sanitary measures and use of insecticide (DDT)
5. Tse-tse fly		blood and transmits trypanosome (a protozoan parasite) which causes sleeping sickness anaemia and loss of weight.	ng bushes around a farmland, use of insecticide

Economic Importance of Pests

Reduction in yield and productivity of crops and plants.

Reduction in quality of farm produce.

Increase in cost of production in the course of controlling.

Reduction in income of farmers.

They render farm produce unattractive and unmarketable.

They cause malformation in plants and animals.

They cause death of plants and animals.

Evaluation

1. Discuss the life cycle of the following animal parasites (a) Round worm (b) liver fluke
2. What are parasites?

Diseases

A disease is a change of the plant or animal from the normal state of health, presenting marked symptom or outward visible signs in the organism. Disease pathogens are disease causing organisms, which include bacteria, viruses, fungi, nematodes and protozoan.

Diseases of Crops, Effects and Control

E OF DISEASE	SATIVE ORGANISMS	PTOMS	TROL
1. Maize rust	s	nd grains covered with black spores, premature death.	fungicides before planting.
2. Groundnut rosette		s curl and turn yellow, show mottling and wrinkles, leads to death.	t and burn infected plants. Plant resistant varieties
3. Rice blasts	s	ı spots on leaves, leaves dry up.	esistant variety, apply fungicide.
4. Cassava mosaic		ted leaves, yellow patches on leaves, stunted growth	esistant varieties
5. Cocoa black pod	s (Phytophytorapalmivora	ı spots on pods. The pods turn black and dry up	fungicides. Remove and burn all infected pods
6. Cassava wilt	ium	s wilt and fall off	planting, crop rotation
7. Cocoa swollen shoot		and roots become swollen, leave chlorolysis	infected plants, use resistant varieties

Evaluation

1. Discuss one disease of cassava, cocoa and maize under the following sub headings a. causative organism b. mode of transmission c. symptoms d. control
2. Mention the groups of disease pathogens.

Livestock Diseases, Effect and Control

E OF DISEASE	ATIVE ORGANISMS	PTOMS	TROL
1. New castle disease (poultry)		twisting, paralysis of legs, respiratory and nervous disorder, low productivity and death	tion, vaccination
2. Rinder pest (cattle)		ever and diarrhea	on of infected animal, vaccination
3. Anthrax (cattle, goat, sheep)	ia	ngs in the neck, and lower abdomen, fever, blood stained discharge from the nostrils	nizatio, sanitation
4. Coccidiosis (poultry)	oan	stool, affects intestines	tion
5. Trypanosomiasis (cattle)	oan (trypanosome)	ittent fever, general body weakness	tse-tse fly with insecticide, rear resistant breed

Evaluation

1. What is a disease?
2. Describe the disease pathogens, effects and control of diseases of poultry and cattle.

GeneralEffectsof Pests&Diseases

a. Reduction in yield and productivity of crops and plants
b. Reduction in quality of farm produces
c. Increase in cost of production in the course of controlling them
d. Reduction in income of farmers
e. They render farm produce unattractive and un marketable
f. They cause malformation in plants and animals.
g. They cause death of plants and animals.

GeneralControlofPests& Diseases

a. **Cultural control** – use of farm practice to prevent or control pests and diseases e.g crop rotation, regular weeding, early harvesting, and use of resistant varieties.
b. **Biological control** - The introduction of natural enemies of pests to control the pests.
c. **Physical control** - Physical removal of pest by hand – picking, setting traps, shooting or fencing a farm with wire nets.
d. **Chemical control** - Use of chemicals called pesticides to control pests.

General Evaluation

1. List five general effects of pests and diseases on plant and animals.
2. State four ways of controlling pests and diseases.
3. Mention five examples of fungal disease.
4. Differentiate between a pest and a pathogen.
5. State five economic importance of pests

Reading Assignment: College Biology by IdodoUmeh. Chapter 23, page

WEEKEND ASSIGNMENT

1. Which of these is not a pest of crop? (a) Insect (b) Birds (c) Ticks (d) None of the above
2. The following are viral diseases except (a) under pest (b) coccidiosis (c) new castle (d) none of the above
3. The following **except one** are cultural ways of controlling pests (a) Regular weeding (b) early planting (c) crop rotation (d) use of lethal chemicals
4. Which of these is not an endoparasite? (a) Round worm (b) Louse (c) Liver fluke (d) Tape worm
5. Neck twisting, paralysis and nervous disorder are marked symptoms of (a) rinder pest (b) coccidiosis (c) new castle (d) ringworm

Theory

1. Define the following terms (a) pest (b) parasite (c) diseases (d) resistant varieties
2. Discuss one plant and one animal disease each caused by (a) virus (b) bacteria (c) protozoan

WEEK THREE **DATE .....**

FOOD PRODUCTION AND STORAGE

CONTENT: -

Introduction

- Role of Government in Agricultural Food Production
- Environmental Factors Required for Food Production
- Ways of Improving Crop Production
- Effects of food shortage on population
- Methods of food preservation
- Effects of food storage over population

Introduction

Food production depends on the following

1. Role of government in agricultural production
2. Environmental factors required for food production
3. 3Ways of improving crop production

Role of Government in Agricultural production

The role of government in agricultural production include
Provision of agro-chemicals
Provision of financial assistance.
Provision of high quality planting materials
Provision of tractors and other implements
Provision of extension services
Establishment of river basin authorities
Provision of storage and processing facilities
Provision of effective transportation network
Efficient quarantine measures
Provision of research work

Environmental Factors Required for Food Production

Environmental factors affecting food production include the biotic and abiotic factors.

Abiotic factors include: I. Rainfall II. Temperature III. Wind IV. Sunlight V. Relative humidity VI. Solar radiation VII. Edaphic factor; soil pH, soil texture, and soil structure.

Biotic factors affecting food production include I. Soil organisms II. Pests III. Parasites IV.Diseases V. Weeds VI. Predators

Ways of Improving Food Production

Food production can be improved by

I. crop improvement method,
II. proper timing of plant,
III. adoption of better cultivation methods,
IV. control of weeds,
V. use of good crop varieties,
VI. use of resistant variety,
VII. use of manures and fertilizers,
VIII. control of pests of crops,
IX. control of diseases of crops.

Effects of Food Shortage on Population Size

There is a direct relationship between population size and food supply. As the population of organisms increases, the quantity of food produced should increase accordingly. However, when there is food shortage due to food wastage, the following result:-

(a) High cost of food making food unavailable to the common man.

(b) **Competition**: Situation in which the organisms in a population struggle for limited available essential of life e.g. food. This results in survival of the fittest in the population.

(c) **Cannibalism**: This is an animals feeding on one another.

(d) **Emigration**: This is the outward movement of organisms from a particular population when there is shortage of food.

(e) **Increased death rate (which is called mortality):** especially of organisms which could not survive competition or migrate out.

Evaluation

1. What are the effects of food shortage on population size?
2. Define cannibalism.

Methods of Food Preservation (Storage)

The methods and principles of preserving food include

Salting: This involves coating of the food with table salt or common salt (NaCl).

Principle: The salt on the surface of the food dehydrates it i.e. it removes water from the food.

This form a highly concentrated solution which has osmotic pressure than the cytoplasm of the micro organisms that cause decay. The salts inhibit the growth of the microbe or kill them. This method can be used for fresh meat, fish etc.

Drying: Food such as vegetables, maize, cassava, fish, meat etc. can be preserved by drying under the sun.

Principle: Drying reduces water content of the food thus making it unsuitable for the growth of spoilage micro organisms due to increased osmotic concentration of food.

Smoking: Involves placing the food over naked fire to dry it. Food preserved this way includes meat, fish, groundnut, plantain etc.

Principle: The smoke creates an oxygen deficient environment that kills micro organisms. The smoke also contains chemicals that are poisonous to the organisms.

Evaluation

1) List three methods of preserving food.

2) What are the principles of the methods mentioned above?

Method of Food Preservation

1. Refrigeration/Freezing: This involves keeping food in the refrigerator or freezer at low temperature. Such food includes fruit, vegetables, milk, bread, fish, meat etc. Low temperature reduces the metabolic rate of microbes. Some can even be killed thus reducing spoilage considerable.

2. **Pasteurization**: This is the heating of some food product to a very high temperature ($72^{O}C$) for about 10 minutes and its immediate cooling for the purpose of storage. The high temperature destroys the spoilage microbes. Milk, cheese, beef can be preserved this way. Pasteurization usually precedes canning or bottling method of food preservation.

3. **Canning/Bottling**: This is the storage or sealing of processed and consumable food in cans or bottle under special conditions for future consumption. This is used for food like fruit, meat, fish, and beans. etc. Microbes are gradually killed, entrance of new ones is prevented and long storage is ensured.

4. **Irradiation**: This is the subjection of some food e.g. Milk, Canned food, tubers, fruit juices etc, to a high radiation such as ultraviolet rays. The irradiation kills the microbes in the food and also prevents the entrance of new ones.

5. **Chemicals:** This is the addition of harmless chemicals to food e.g. soft drink, vegetables etc.

Principle: The chemical choke spoilage organisms in the food. It also dehydrates or toxicate the microbes.

Evaluation

1. How is pasteurization related to canning or bottling method of preservation?

2. Food storage reduces the effect of natural disaster, explain.

Effects of Food Storage on Population

1. **Prevention of hunger and famine**: Hunger or famine that would have resulted from food shortage is averted with preservation of food.

2. **Maintenance of stable price**: During harvest, food is cheap. However food storage ensure the availability of food through out the year. This helps in the maintenance of stable price.

3. Reduce the effect of natural disaster, flood, earthquake, pest attack and even war cause farm crop failure or destroy entrance farm activities. Food already stored etc. harvest will save people from starvation in the period of scarcity.

4. Food storage provides employment for workers especially in food processing company.

Evaluation

1. What are the effects of food storage on population?

2. Highlight ways of improving food production.

3. Mention four abiotic factors that affect food production.

4. List the edaphic factors that affect food production.

5. What is pasteurization?

Reading Assignment: College Biology by IdodoUmeh. Chapter 20, page 448.

Weekend Assignment

1) The following except one results from food shortage (a)Competition (b) Reduced mortality rate (c) Emigration (d) Increased mortality rate.

2) Food shortage makes the population size (a) increase (b) decrease (c) stabilize (d) fluctuate

3) Food storage results in (a) stability of price (b) Natural disaster (c) high natality rate (d) overpopulation

4) These are methods of storing and preserving food except (a) Silos (b) barns (c) refrigeration (d) Marketing.

5) The biggest factor that affects food production in Africa is (a) improper food storage (b) drought (c) low utilization of land (d) static farming technology.

Theory

1 a. List three methods of preserving food.

b. Explain the principle involved in the method listed above.

2. State five ways of improving crop yield.