**LESSON NOTE 1**

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| **CONSERVATION OF NATURAL RESOURCES**  **DEFINITION:** conservation is defined as the planned, controlled exploitation of judicious use of natural resources to ensure their continuous availability and to preserve the quality or original nature of the environment. It is the preservation of natural resources from loss, waste, or exploitation through rational use and to ensure their continued use or availability. Natural resources can be renewable or non-renewable.  NEED FOR CONSERVATION   1. To prevent the destruction of natural environment or allow for continued use of natural resources for the benefit of man 2. To preserve rare and valuable species of plants and animals for the future generation to save them from extinction 3. To promote the recycling of some scare mineral resources e.g. water. 4. To prevent the destruction of natural ecosystem; this will allow the organisms in the ecosystem to survive.   METHODS OF CONSERVATION OF NATURAL RESOURCES   1. Instead of deforestation, think of afforestation. Everyone should take part in plantation and care of crops 2. Limit o stop the over utilization of natural resources 3. Recycling of waste to restore biodiversity should be a habit 4. Encourage the use of manures and organic fertilizers as well as practices like mixed cropping, crop rotation, 5. Use of renewable energy sources as much as possible. Etc.   PROBLEMS OF CONSERVATION   1. Poverty mitigate against obeying conservation laws 2. Lack of political will among political class 3. Limited sources of energy lead to destruction of natural forest for firewood 4. Inadequate planning and overpopulation results in non-implementation of conservation laws and excessive use of natural resources. |

**LESSON NOTE 2**

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| PEST AND DISEASES OF PLANTS    A pest is any organism that spreads disease, causes destruction or is otherwise a nuisance. It can cause any type of damages to the crop thereby reducing their yield and economic values. Disease is a particular abnormal condition that negatively affects the structure or function of all or part of an organism.  CLASSIFICATION OF PEST    Pest can be classified based on- the body part of crops/plant they attack and the type of animals (vertebrate or non-vertebrates)   1. CLAASIFICATION BASED ON PARTS OF PLANT THEY ATTACK: leaf feeders, Root feeders, Stem borers, Young shoot feeders, Fruit and seed eaters and pests of stored grains 2. Leaf feeders feed mainly on the leaves of the plants. They are referred to as defoliators because they cause the removal of leaves (foliage) of crops (defoliation). Examples include; grasshoppers, beetles, pecan leaf case bearer, moth caterpillar, sawfly larva etc. 3. Root feeders feed on roots of crops. The live mostly inside the soil and either prune off roots below the surface or suck root fluids which make them wilt or stunt the growth of the crop. Examples are beetles, gnats, meadow mice, root-knot nematodes etc. 4. Stem borers attack the stems of plants by boring holes in them to feed on the vascular tissues. Examples are maize weevils, moths etc. 5. Young shoot feeders feed on young shoots of crops by piercing into the shoot and sucking juices from the shoots. Examples include water flies, aphids, rabbits, slugs and mice 6. Fruit and seed eaters include cotton stainer. Weevils, fruit files etc. 7. Pests of stored grains infest harvested or stored crops especially cereal grains, they include weevils, beetles, moths and rodents like rats rabbits etc. 8. CLASSIFICATION BASED ON THE ANIMAL TYPE 9. Invertebrate pests: they do not have backbones. They include grasshopper, cotton boll weevil, fruit flies, beetles, ticks, crickets, termites, etc. 10. Vertebrate pest possess backbones, examples are rats, rabbits, grass cutters, pigs, monkeys, squirrels, deer and birds (weaver birds, guinea fowl, pigeon, etc.)   CLASSIFICATION BASED ON MOOD OF FEEDING   1. Biting and chewing Insects possess strong mandible and maxillae which enable them to bite and chew plants e.g. grasshoppers, leaf worms, locust, termites etc. 2. Piercing and sucking insects possess proboscis which enable them to pierce through plants and suck liquid materials from plants tissues. E.g. aphids, cotton strainers, white flies etc. 3. Boring insects including their larvae bore into plants and destroy their tissues, fruit or seeds. E.g. bean beetle, stem borers, maize and rice weevils. |

**LESSON NOTE 3**

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| **LIFE CYCLE OF PESTS**  **LIFE CYCLE BEETLE**    Beetle undergoes complete metamorphosis which means that they pass through 4 stages of development;   1. Egg stage: female beetle lays hundreds of tiny oval white or yellow eggs on a leaf, in the soil or rotten wood depending on the species involved. It takes 4-19 days for eggs to hatch to larva 2. Larval stage: the larva beetle is called a **grub** and it eats huge amount of food to keep growing and shedding its exoskeleton many times as it grows (moulting) 3. Pupa stage: gradual transformation to adult stage takes place here, the pupa is inactive and this stage lasts for 9months 4. Adult beetle: this emerges from the pupa and move, feeds and mates with the female beetle. The whole cycle starts all over again.   **LIFE CYCLE OF A GRASSHOPPER**    Grasshopper undergoes incomplete metamorphosis hence the life cycle is in 3 stages   1. Egg stage: the female grasshopper lays fertilized eggs (over 10 egg pods which contains 10-200 rice shaped eggs) underneath sand or among leaf litters. They remain dormant for 10months especially during winter and hatch when the weather becomes warm 2. Nymph stage: nymphs feed on soft succulent plant foliage and undergo 3-6 moults and change their forms before becoming adults. 3. Adult stage: the final stage of development starts after 25-30 days of being in the nymph stage. The grasshopper gain sexual maturity after 15 days and the cycle continues.   **DISEASES CUASED BY PESTS AND THEIR AGENTS**  There are many diseases that affect crop plants. The diseases caused mainly by fungi, bacteria, viruses and nematodes. They are called casual agents. Some common crop diseases are;   1. Maize smut: caused by a fungus which attacks the corn plant and reduces its yield. 2. Cassava mosaic is a viral disease, it is seen as green to yellow spots on the cassava leaves. It causes low yield 3. Groundnut rosette: a peanut pathogenic virus that is transmitted between plants by insect vectors such as groundnut aphids etc.   **METHODS OF CONTROLLING PESTS**  Pests can be controlled through the following methods.   1. Physical method: involves the removal of pests by hand-picking of insects and their larvae, setting traps for rodents, shooting rodents with guns and fencing farm with wire nets 2. Cultural method: involves the use of farm practices to prevent or control pests especially on the field. They include crop rotation, mixed cropping, early planting. Use of resistant varieties. Etc. 3. Chemical method: involves the use of chemical to eliminate pest population, chemicals used include, pesticides, avicides, rodenticides, nematicides, insecticides. 4. Biological method: involves the introduction of the natural enemies of the pests to control their population by eating them up.   HOME FUN  Explain the life cycle of any other two pests that you know. |

**LESSON NOTE 4**

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| **REPRODUCTION SYSTEM IN FISH AND REPTILES**  Fish reproduce through a variety of methods, and their reproductive strategies can vary based on species and environmental conditions. The main types of reproduction in fish are:   1. Oviparous reproduction: most fish lay eggs. Female fish release eggs into water and the male fish release sperm (milt) to fertilize the eggs (broadcast spawning). This process referred to as external fertilization. The fertilized eggs develop in water and once the eggs hatch, the offspring are on their own. 2. Viviparous reproduction: this process is termed internal fertilization as the male fish transfers sperm to the female through specialized structures. The embryos develop within the female’s body and the offspring born in more advanced state, capable of swimming and feeding independently. 3. Ovoviviparous reproduction: there is no fertilization in this reproduction, the eggs produced by the female remain in the female’s body and the developing embryo are nourished by the egg yolk and then they are born   Summarily, fertilization can be internally (inside the body of the female) or externally where both egg and sperm are released into the water and for them to meet ad for fertilization to occur.  **REPRODUCTION IN FISH**    Fishes exhibit sexual reproduction but fertilization is external with the reproductive system found in within the abdomen.  ***Male Tilapia***  It consists of two testes and a male duct that leads to the genital opening. The testes suspended in the abdomen are elongated structures joined in the posterior parts as a single duct.  ***Female Tilapia***  The female has two ovaries that produce eggs with small amount of yolk. They are discharged into the body cavity and wafted into the oviducts which open internally into the body cavity and leads to the genital opening.    Tilapia fish does not have a well reproductive system hence the male and female gametes have to meet outside the body of the female fish. The fish pair through courtship where male and female fish swim along. The male will shade its sperm while the female lays the eggs which will be fertilized. The eggs produced by the female lack shell as they enclosed in a jelly-like structure that prevents them from eaten by predators. The fertilized egg is composed of embryo and yoke which nourishes it.  **REPRODUCTIVE SYSTEM OF REPTILES**    Reptiles employ different reproductive strategies but majority are oviparous, meaning they lay eggs. The eggs are usually shelled and laid in a protected nest or environment. Reptiles such as snakes and lizards are viviparous, giving birth to live young. In these species, the embryos develop within the female’s reproductive tract, receiving nourishment directly from the mother.  ***Male Agama lizard***  The male agama lizard has two testes and two penises located in the abdomen, with the right testes slightly higher in position than the left. Both penis release sperm into the female during fertilization.  ***Female Agama lizard***  In the female, the ovaries are located in the same position as the testes are in the abdomen in the male. The eggs are released by the action of some cilia and are moved into the oviduct. Albumin and shell are deposited on the eggs as they move down. The oviduct opens at the posterior end into the cloaca near the openings of the uterus. Fertilization takes place internally as mating takes place between the male and female lizard.  **DIFFERENCES BETWEEN REPRODUCTIVE SYSTEM OF FISH AND REPTILE**   |  |  |  | | --- | --- | --- | |  | FISH | REPTILE | | FERTILIZATION | Externally, male fertilize female eggs outside the body | Internally, male fertilize female eggs inside the body | | ORGAN OF REPRODUCTION | Male reproductive system includes testes that produce sperm and the female system includes ovaries that produce eggs | Male system includes one or two penises that pass sperm to the female’s cloaca while the female system includes ovaries and oviduct. | | LOCATION OF OFFSPRING | Lays eggs in aquatic habitat | Lays eggs on land after mating | |

**LESSON NOTE 5**

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| **REPRODUCTIVE SYSTEM OF BIRDS AND MAMMALS**  REPRODUCTIVE SYSTEM IN BIRDS    The male and female reproductive systems have distinct structures and functions.  ***Male Reproductive system***    Consists of the testes which produces sperm, vas deferens which transports the sperm to the cloaca, the opening for digestive, urinary and reproductive system (cloaca). Male birds do not have penis  ***Female bird***    Consists of the ovaries which produce the eggs, the oviduct which is the site of fertilization and the cloaca which is where the eggs are laid.  REPRODUCTIVE SYSTEM IN MAMMALS  ***Male mammal***    The male mammalian reproductive system e.g. man consists of the following   * Testes: two sacs of skin in all male for production of sperm and male sex hormones * Seminiferous tubules: located in the testes and are the point in which the sperm are produced * Epididymis: stores and matures sperm * Vas deferens or sperm duct: carries sperm to seminal vesicle * Prostrate gland and seminal vesicle: contributes fluids to semen * Urethra: aids in the passage of sperm into the vagina and also in passing urine out of the body * Penis: contains spongy tissues which can be filled with blood causing the penis to erect.   ***Female mammal***    The female mammal has the following organs in its reproductive system   * Ovaries: produces eggs and hormones * Oviduct (fallopian tubes): site and fertilization and passage of fertilized egg to the womb * Uterus or womb: a muscular organ which nurtures and supports developing fetus/embryo * Cervix: opening between the uterus and vagina and controls the opening and closing of the vagina during birth * Vagina: receives sperm during copulation and allows passage of foetus during birth.   DIFFERENCE BETWEEN MALE AND FEMAAL GAMETES IN BIRDS   |  |  |  | | --- | --- | --- | | CHARACTERISTICS | MALE GAMETE | FEMALE GAMET | | REPRODUCTION SITE | Testes | Ovaries | | Function | Fertilizes the egg | Receives and nourishes the sperm | | Quantity produced | Numerous | Limited(usually one per cycle) | |