AGRICULTURAL SCIENCE

FOR

Junior Secondary School

1

AKADALEARN

JSS 1

AGRICULTURAL SCIENCE

FIRST TERM

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Week 1

MEANING AND IMPORTANCE OF AGRICULTURE

Topic: MEANING AND IMPORTANCE OF AGRICULTURE

Contents:

What is Agriculture?

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A. What is Agriculture?

Agriculture means all the activities involved in rearing of animals and cultivation of crops for man's and the nation's benefits. The word agriculture was derived from two Latin words which are 'agar' and 'culture' meaning 'land' and 'cultivation'. Agriculture is often defined by many people as the cultivation of land. As a science, it deals with the systematic study of plants and animal lives in their environment and seeks to provide natural conditions for them so as to produce the best quality which are used directly or indirectly by man.

B. Branches of Agriculture

There are seven different branches of agriculture by industry, these include

- Aqua farming
- Farming
- Apiculture (Beekeeping)
- Forestry
- Fishing
- Ranching
- Whaling

Aquaculture: Aquaculture, also known as aqua farming, is the farming of aquatic organisms such as fish, crustaceans, molluscs and aquatic plants. Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish. Broadly speaking, finfish and shellfish fisheries can be conceptualized as akin to hunting and gathering while aquaculture is akin to agriculture. Mariculture refers to aquaculture practiced in marine environments and in underwater habitats.

Farming: Farming is the growing crops or keeping of animals by people for food and raw materials. Farming is a part of agriculture.

Apiculture: Beekeeping (or apiculture, from Latin: apis "bee") is the maintenance of honey bee colonies, commonly in hives, by humans. A beekeeper (or apiarist) keeps bees in order to collect their honey and other products that the hive produces (including beeswax, propolis, pollen, and royal jelly), to pollinate crops, or to produce bees for sale to other beekeepers. A location where bees are kept is called an apiary or "bee yard"

Forestry: Forestry is the science, art, and craft of creating, managing, using, conserving, and repairing forests and associated resources, in a sustainable manner, to meet desired goals, needs, and values for human benefit. Forestry is practiced in plantations and natural stands. The challenge of forestry is to create systems that are socially accepted while sustaining the resource and any other resources that might be affected. The forest science has elements that belong to the biological, physical, social, political and managerial sciences

Fishery: Generally, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery. A fishery is typically defined in terms of the "people involved, species or types of fish, area of water or seabed, method of fishing, class of boats, purpose of the activities or a combination of the foregoing features". The definition often includes a combination of fish and fishers in a region, the latter fishing for similar species with similar gear types. A fishery may involve the capture of wild fish or raising fish through fish farming or aquaculture.

Ranching: Ranching is the practice of raising herds of animals on large tracts of land. Ranchers commonly raise grazing animals such as cattle and sheep. Some ranchers also raise elk, bison, ostriches, emus, and alpacas. The ranching and livestock industry is growing faster than any other agricultural sector in the world.

Whaling: Whaling is the hunting of whales primarily for meat, oil, and blubber. Its earliest forms date to at least circa 3000 BC.

C. HISTORICAL DEVELOPMENT OF AGRICULTURE

Agriculture began when man started to exist on earth. The early men lived by gathering wild fruit and hunting wild animals because they are wanderers. The type and quantity available at that time was irregular and uncertain and was subject to the prevailing weather and luck.

They continued with this nomadic life until large population of the families and properties necessitated the building of huts, so they changed from their nomadic way of life to a more settled life.

Agriculture and its practices i.e farming started by accident about 12,000 years ago, when the early men discovered that seed and other propagative parts of remains of their food germinate, grow to maturity and reproduce their kinds, they also discovered that certain animals were friendly, so they began to domesticate them. Moreover crops and animals from different parts spread to other countries by the early missionaries, explorers and traders.

Agriculture has undergone significant developments since the time of the earliest cultivation. The Fertile Crescent of Western Asia, Egypt and India were sites of the earliest planned sowing and harvesting of plants that had previously been gathered in the wild. Independent development of agriculture occurred in northern and southern China, Africa's Sahel, New Guinea, parts of India and several regions of America. Agricultural techniques such as irrigation, crop rotation, the application of fertilizers were developed soon after the Neolithic Revolution but have made significant strides in the past 200 years. The Haber-Bosch method for synthesizing ammonium nitrate represented a major breakthrough and allowed crop yields to overcome previous constraints.

In the past century, agriculture in the developed nations, and to a lesser extent in the developing world, has been characterized by enhanced productivity, the replacement of human labor by synthetic fertilizers and pesticides, selective breeding, and mechanization. The recent history of agriculture has been closely tied with a range of political issues including water pollution, biofuels, genetically modified organisms, tariffs, and farm subsidies.

D. IMPORTANCE OF AGRICULTURE

The three major importance of agriculture to man are

Food

Clothing

Shelter

Other importance of agriculture to nation are

Provision of raw materials for agro-allied industries

Employment or job opportunity

Foreign exchange Earning

Source of income

Provision of market for industrial goods

Revenue

ASSESSMENT

..... is the maintenance of honey bees colonies. a) Epiculture b) Apiculture c) Opiculture d) Aquaculture

..... is not a branch of agriculture a) forestry b) fishery c) leafry d) apiculture

..... refers to a type of aquaculture practiced in marine environment a) Marineculture b) Mariculture c) Maniculture d) Mariqualture

Agriculture means..... a) rearing of crops and cultivation of animals for man and the nation's consumption b) rearing of animals for human consumption c) rearing of animals and cultivation of crops for man and the nation's consumption d) activities involved in man's consumption.

What is Ranching?

ANSWER

1. B
2. C
3. B
4. C
5. Ranching is the practice of raising herds of animals on large tracts of land. Ranchers commonly raise grazing animals such as cattle and sheep. Some ranchers also raise elk, bison, ostriches, emus, and alpacas.

week2

Topic: Forms of Agriculture

Introduction

Agriculture is defined as the cultivation of the land to produce crops and the rearing of animals for man's use. Agriculture has many branches. The form of agriculture practiced in an area depends on the size of the farm, purpose, availability of land, the type of soil in the area, topography of the land and the prevailing climatic condition.

Crop Farming

A crop is a plant grown for a specific purpose. Farming is the centre of activity where land is cultivated for the production of either plants or animals or both. Crop farming therefore involves the cultivation of land for the production of useful crops for the benefit of man. When different types of crops are planted on the same piece of land, it is called Mixed Cropping. Crops that may be planted are maize, cowpea, yam, cocoa yam, groundnut, soya bean, tomato, pepper, okra, sorghum and some perennial crops.

Horticulture

This is the study of how to grow fruits, vegetables and ornamental plants. It is a special branch of crop science which is not well developed in Nigeria. Those who specialize in the production of fruits, vegetables and flowers are called horticulturists. Fruits and Vegetable grown by horticulturists include citrus, pawpaw, mango, guava, cashew, pineapple, plantain, garden egg, tomato, lettuce, cabbage, pumpkin, cucumber, cashew, banana. Ornamental plants grown are hibiscus, croton, rose flowers, zinnia, hyacinth, iris, lily, Queen of the night. Ornamental crops are used for beautifying our surroundings.

Livestock farming

This is the system of keeping or rearing different farm animals for different purposes. Animals commonly kept include cattle, poultry, sheep, goats, pigs. Livestock farming may be settled (ranching) or unsettled (normadic herding).

Bee Farming

Apiculture or Bee farming is the process of deliberately keeping or culturing bees in wooden boxes or hives for different reasons.

Types of Bees

Solitary Bees – Most bees in the world are solitary. Mated female live alone in a hole or burrow into well drained soil or soft brick mortar. They have a short life span. Adults live for about 6 to 8 weeks. They do not sting because they do not store honey. Solitary bees

are used for pollinating flowers.

Bumble Bees – These bees live together in colonies and store honey and pollen in wax as food to be used in time of food shortage. There are two types; Bombus bumble bees and Cuckoo bumble bees. Bombus have three social class, a female queen, partially developed female workers and male drones. A colony can contain 1 queen, 300 workers and few drones. Cuckoo have the males and females living separately except during the period of mating. They have no workers.

Honey Bees – They live as a large colony in a large cavity or man-made hives. They have three castes, 1 queen, 70,000 workers and 300 male drones. At the centre, the queen bee lays eggs which develop into workers. The drone eggs are laid later. A typical honey bee hive may contain

1 queen

250 t0 300 drones

20,000 female forages

40,000 female house bees

5000 to 7000 eggs

7000 to 11000 larvae being fed

16,000 to 24,000 larvae developing into Eggs

Importance of Bee Farming

Bees are pollinators of crops and this is important for genetic stability

Bees are kept for honey, bee wax, pollen and propolis which are used for food, medicine or manufacturing other products

The social life of honey bee colony provides a strong basis for the study of the structure of societies

Bees are used for research and education

Fishery

This is a special area of Agriculture which deals with the production and management of fish and other aquatic animals of agricultural importance. Such animals include lobster, squids, shrimps, cray fish, oyster, prawns, periwinkles and crabs. These animals are rich sources of protein.

Snail Farming or Heli culture

Snails are invertebrate with soft bodies that are covered with hard calcareous shells. They belong to the phylum called Mollusca. Heli culture, commonly known as snail farming, is the process of raising land snails specifically for human use, either to use their flesh as edible escargot, or more recently, to obtain snail slime for use in cosmetics, or snail eggs for human consumption as a type of caviar.

Importance of Snail farming

Source of Protein – Snail meat has high protein of about 37% – 51%. It contains almost all the essential amino acids

Source of Iron – The iron content of snail is 45 -59mg/kg. This high iron content is considered in the treatment of anemia

Treatment of different ailments – Snail can be used for the treatment of whooping cough, ulcers, asthma, high blood pressure, constipation, poor eye sight and pile.

Preparation of Animal feed – The shell of snail contains phosphorus and calcium and it can be crushed for the preparation of animal feed.

ASSESSMENT

The system of keeping or rearing different farm animals for different purposes is called ____

Snail farming is referred to as _____

a. Epiculture

b. Apiculture

c. Heli culture

d. Snail culture

One of this is not a type of bee

a. Solitary bees

b. Honey bees

c. House bee

d. Bumble bee

____ is the process of deliberately keeping or culturing bees in wooden boxes or hives for different reasons.

a. Epiculture

b. Apiculture

c. Heliculture

d. Snail culture

___ is the study of how to grow fruits, vegetables and ornamental plants.

a. Epiculture

b. Apiculture

c. Heliculture

d. Horticulture

Answers

1. Livestock farming
2. C
3. C
4. B
5. D

WEEK 3

Topic: TYPES OF AGRICULTURE

Contents:

Types of Agriculture

Difference between Commercial and Subsistence Agriculture

A. Types of Agriculture

The two major types of agriculture are

Commercial Agriculture

Subsistence Agriculture

Commercial (Industrialized) Agriculture: Commercial or Industrialized farming occurs when a farm is set up for the sole purpose of producing crops and farm animals for sale, with the sole intention of making a profit. In this type of agriculture, large quantities of crops and livestock are produced through industrialized techniques for the purpose of sale. The goal of industrialized agriculture is to increase crop yield, which is the amount of food that is produced for each unit of land. Crops and livestock made through this type of agriculture are produced to feed the masses and the products are sold worldwide.

Industrialized agriculture is able to produce large quantities of food due to the farming methods used. Instead of using animal and manpower to work the fields, industrialized agriculture utilizes large machines, which are more powerful and can work faster and harder. The shift towards machines has increased the use of fossil fuels on industrial farms, and, therefore, the price of food can fluctuate as the price of oil changes. Industrialized agriculture also increases crop yield by investing in large irrigation systems and using chemical fertilizers and pesticides.

The chemical fertilizers that are used in industrialized agriculture often add inorganic nutrients to the soil to increase yield and plant size. The use of pesticides is also common in industrialized agriculture, and most pesticides help increase yield by killing pests that are harming or consuming the crops.

Subsistence Agriculture: Mainly practiced by tribes of the tropics, especially in Africa, in tropical South Central America, and in South-east Asia; better known as shifting cultivation. Farmers grow food only for themselves and their families. Shifting cultivation goes by different names in different parts of the world.

Subsistence agriculture is when a farmer lives on a small amount of land and produces enough food to feed his or her household and have a small cash crop. The goal of

subsistence agriculture is to produce enough food to ensure the survival of the individual family. If there is excess food produced, it is sold locally to other families or individuals.

Subsistence agriculture varies a great deal from industrialized agriculture in terms of the farming methods used. This type of agriculture is very labor-intensive because all of the work is done by humans and animals and only hand tools and simple machines are used to work the land.

Subsistence agriculture does not rely on chemical fertilizers or pesticides and instead utilizes more natural techniques. Most farmers have animals, including chickens, goats, and cows, and the manure from these animals is used to fertilize the plants. The crops produced are then consumed or sold, and the inedible parts of the plants are used to feed the livestock. This creates a closed circuit within the farm where nothing goes to waste.

B. Differences between Commercial and Subsistence Agriculture

Subsistence Agriculture

(i) Farming practices in which crops are cultivated for local consumption.

(ii) Farms are small and food crops are cultivated such as rice and wheat.

(iii) Old tools and implements are used by the farmers.

(iv) Depends on monsoon and there is greater use of manpower.

Commercial Agriculture

(i) Farming practice in which goods produced are mainly for the market to get cash.

(ii) Farms are larger and cash crops are cultivated. Such as cotton, sugar-cane, jute.

(iii) Better implements are used and there are proper irrigation facilities.

(iv) Less of manpower is used

ASSESSMENT

What agricultural techniques are best used for large quantities of crops and livestock?
(a) Crude (b) Industrialized techniques (c) Subsistence agricultural (d) Use of manpower

The following are common to commercial agriculture, Except (a) Chemical fertilizers (b) Pesticides (c) Machinery (d) Manpower

What is the sole intention of commercial agriculture (a) Gifts (b) Profits (c) Storage (d) Consumption?

State two difference between commercial and subsistence agriculture

Give two similarities between the two types of agriculture.

ANSWERS

1. B

2. D

3. B

4. Commercial Agriculture is Farming practice in which goods produced are mainly for the market to get cash and Farms are larger and cash crops are cultivated. Such as cotton, sugar-cane, jute While Subsistence Agriculture is Farming practices in which crops are cultivated for local consumption and Farms are small and food crops are cultivated such as rice and wheat.

5. Both commercial and subsistence agriculture produce food for consumption and make use of land for production.

WEEK4

Topic: BRANCHES OF AGRICULTURE

Branches of Agriculture

Agriculture is a broad science with many branches which are explained below:

Animal Science: Animal Science is described as "studying the biology of animals that are under the control of mankind".

Wildlife Conservation: Wildlife conservation is the practice of protecting wild plant and animal species and their habitats. Among the goals of wildlife conservation, they are to ensure that nature will be around for future generations to enjoy and to recognize the importance of wildlife and wild lands to humans.

Veterinary Science: Veterinary Science is the study of the diseases and health maintenance of animals. It is a major aspect of agriculture that prepares students for careers concerned with animal health and welfare, biological or biomedical sciences and biotechnology or related fields which require scientific-based academic preparation.

Fishery: Generally, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery. A fishery is typically defined in terms of the "people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, purpose of the activities or a combination of the foregoing features". The definition often includes a combination of fish and fishers in a region, the latter fishing for similar species with similar gear types. A fishery may also involve the capture of wild fish or raising fish through fish farming or aquaculture.

Crop Science: Crop science is the study of the world's major food, feed, turf, and fiber crops and their environment. It is a broad discipline encompassing breeding, genetics, production, and management.

Agricultural Engineering: Agricultural engineering is the engineering discipline that applies engineering science and technology to agricultural production and processing. Agricultural engineering combines the disciplines of mechanical, civil, electrical and chemical engineering principles with a knowledge of agricultural principles.

Agricultural engineers may engage in any of the following areas:

- design of agricultural machinery, equipment, and agricultural structures
- internal combustion engines as applied to agricultural machinery
- agricultural resource management (including land use and water use)

- water management, conservation, and storage for crop irrigation and livestock production
- surveying and land profiling
- climatology and atmospheric science
- soil management and conservation, including erosion and erosion control
- seeding, tillage, harvesting, and processing of crops
- livestock production, including poultry, fish, and dairy animals
- waste management, including animal waste, agricultural residues, and fertilizer runoff
- food engineering and the processing of agricultural products
- basic principles of circuit analysis, as applied to electrical motors
- physical and chemical properties of materials used in, or produced by, agricultural production
- bioresource engineering, which uses machines on the molecular level to help the environment.
- Design of experiments related to crop and animal production

Agricultural Extension: Agricultural extension is a general term meaning the application of scientific research and new knowledge to agricultural practices through farmer education. The field of 'extension' now encompasses a wider range of communication and learning activities organized for rural people by educators from different disciplines, including agriculture, agricultural marketing, health, and business studies.

Extension practitioners can be found throughout the world, usually working for government agencies. They are represented by several professional organizations, networks and extension journals.

Agricultural Economics: Agricultural economics is an applied field of economics concerned with the application of economic theory in optimizing the production and distribution of food and fibre — a discipline known as Agronomics. Agronomics was a branch of economics that specifically dealt with land usage.

Apiculture: Apiculture is derived from the honeybee's Latin name Apis mellifera, meaning 'honey gatherer'. Since bees do not collect honey but nectar from which honey is made, the scientific name should actually be Apis mellifica meaning 'honey maker'.

Although apiculture refers to the honeybee, the vital role all bees play in the pollination of crops and flowering plants has caused apiculture to also include the management and

study of non-Apis bees such as bumblebees and leafcutter bees.

Some 90 million years ago, flowering plants first appeared on earth. The wasp-like ancestors of bees took advantage of the food made available by flowers and began to modify their diet and physical characteristics. Since then, flowering plants and bees co-evolved. This eventually led to a complete interdependence, meaning that flowering plants and bees cannot live and reproduce without each other.

Soil Science: Soil science is the study of soil as a natural resource on the surface of the Earth including soil formation, classification and mapping; physical, chemical, biological, and fertility properties of soils; and these properties in relation to the use and management of soils.

Forestry: Forestry is the science, art and practice of understanding, managing and using wisely the natural resources associated with, and derived from forest lands.

These resources include timber, water, fish, wildlife, soil, plants, and recreation. Forest lands are instrumental in the beauty and spiritual impact of our landscape. The utilization of all of these resources is part of the cultural heritage of British Columbia, and modern resources management embraces these values. Finding a balance between these multiple uses, while sustaining and conserving forest resources is the basis of this challenging and exciting program of study.

Sericulture or Silk farming: Sericulture, or silk farming, is the rearing of silkworms for the production of silk. Although there are several commercial species of silkworms, Bombyx mori is the most widely used and intensively studied silkworm.

Heli culture: Heli culture, commonly known as snail farming, is the process of raising land snails specifically for human use, either to use their flesh as edible escargot, or more recently, to obtain snail slime for use in cosmetics, or snail eggs for human consumption as a type of caviar.

Cuniculture: Cuniculture is the agricultural practice of breeding and raising domestic rabbits, usually for their meat, fur, or wool. This differs from the simpler practice of keeping a single or small group of rabbits as companions, without selective breeding, reproduction, or the care of young animals.

Herpetoculture: Herpetoculture is the keeping of live reptiles and amphibians in captivity, whether as a hobby or as a commercial breeding operation. “Herps” is an informal term that refers to both reptiles and amphibians.

ASSESSMENT

1. ____ is the rearing of silkworms for the production of silk

   a. Silk culture

   b. Seri culture

   c. Hepi culture

   d. Heli culture

2. _____ is a general term meaning the application of scientific research and new knowledge to agricultural practices through farmer education

   a. Agricultural extension

   b. Agricultural economics

   c. Agricultural education

   d. Agricultural School

3. ____ is the agricultural practice of breeding and raising domestic rabbits, usually for their meat, fur, or wool.

   a. Heliculture

   b. Epiculture

   c. Sericulture

   d. Cuniculture

4. ____ is discipline that applies engineering science and technology to agricultural production and processing.

   a. Agricultural extension

   b. Agricultural economics

   c. Agricultural education

   d. Agricultural engineering

5. Whats the difference between herpetoculture and Heli culture?

6. Define forestry

7. What is silk farming?

Answers

1. B
2. A
3. D
4. D
5. Other answers are in the note above

Week 5

Topic: Crop Plant Form

Contents:

- The Root and Shoot of a flowering plant
- Structure and Function of each part of a flowering plant

Introduction

Your basic vascular plant parts are roots, shoots, stems, and leaves. Of course, there's a wealth of variety within these types or parts, but it boils down to those four. Each part has distinct functions. Together, these parts reflect how vascular plants evolved to inhabit two distinct environments at the same time: the soil and the air. Why would plants do such a thing? The soil offers water and vital minerals. The air offers carbon dioxide and the energy of sunlight. To forge the successful lifestyles they enjoy today, plants evolved systems to tap into all these resources, both above and below the ground. In short, plants evolved roots and shoots. Shoots, in turn, can develop stems and leaves.

The Root and Shoot Of a Flowering Plant

Roots

Roots are branched, underground structures that serve two major functions. First, somewhat obviously, roots firmly anchor the plant to a fixed spot. Once a plant takes root and begins to grow in an area with good access to moisture, soil nutrients, and light, it pays to stay. Second, roots serve as transport systems, allowing the plant to suck up water and dissolved nutrients from the soil to support the plant's growth. Roots have specialized parts that develop from the three major types of plant tissue: ground, dermal, and vascular. The roots of a flowering plant are very important. They keep the plant anchored in the ground and obtain nutrients and water from the soil. The roots also store food. Nutrients and water are absorbed through tiny root hairs that extend from the root system. All roots however, do not originate underground. Some plants have roots that originate above ground from stems or leaves. These roots provide support for the stems.

Functions of Plant Root System

1. Anchorage and support – The plant root system anchors the plant in the soil and provides physical support. Redwood trees (a gymnosperm) about 100 meters tall have stood erect for thousand years only because millions of individual fibrous roots dig into the ground, even though the depth of penetration is only up to about 5 meters. In general, however, taproot system provides more effective anchorage such that they are more resistant to toppling during storms.

2. Absorption and conduction – The plant root system absorbs water, oxygen and nutrients from the soil in mineral solution, mainly through the root hairs. They are capable of absorbing inorganic nutrients in solution even against concentration gradient. From the root, these are moved upward. Plants with a fibrous root system are more efficient in absorption from shallow sources.

3. Storage – The root serves as storage organ for water and carbohydrates as in the modified, swollen roots of carrot, sweet potato and yam bean. Fibrous roots generally store less starch than taproots. Some roots are capable of storing large amounts of water; the taproots of some desert plants store more than 70 kg of water.

4. Photosynthesis – Some roots are capable of performing photosynthesis, as in the epiphytic orchids and aerial roots of mangrove.

5. Aeration –Plants that grow in stagnant water or other watery places have modified roots called pneumatophores to which oxygen from the air diffuses.

6. Movement – In many bulb- and corm-forming plants, contractile roots pull the plant downward into the soil where the environment is more stable.

7. Reproduction – The plant root system also serves as a natural means of perpetuating a species. In mature agoho or horsetail tree and certain plants, clonal seedlings or offshoots are commonly seen growing profusely around the trunk from horizontally growing roots. Likewise, new plants emerge from left-over tuberous roots after harvest in fields grown to sweet potato and yam bean. As a rule, plants with a fibrous root system are easier to transplant than those with tap roots.

Shoots

Shoots target the above-ground business of the plant. Very young plants may possess only simple, undeveloped shoots. As a plant grows, however, these tender shoots develop into stems and leaves. So, stems and leaves are really part of the shoot system. Stems and leaves are so different and specialized that it is worth considering them separately. Overall, the shoot system enables a plant to grow taller to gain access to energy-giving light, and allows the plant to convert that light energy into the chemical energy of sugar. Like roots, shoots develop from ground, dermal, and vascular tissues. Shoot system is above ground and includes organs such as leaves, buds, stems, flowers, and fruits.The functions of the shoot system include photosynthesis, reproduction, storage, transport, and hormone production.

Organs In Plant Shoot System

Stems

Stems are sturdy structures that grow in order to give a plant a fighting chance to spread its leaves in the sun. Stem growth can add to the plant's height, broaden the area covered by the

leaves, or even direct growth from a dark area toward one with more light. To provide mechanical support for a growing plant, stems need to be strong. To help move water and nutrients to the furthest reaches of the plant, stems are stuffed with little transport pipes in the form of xylem and phloem.

Functions of the Stem

In plant growth and development, the plant stem performs the following functions:

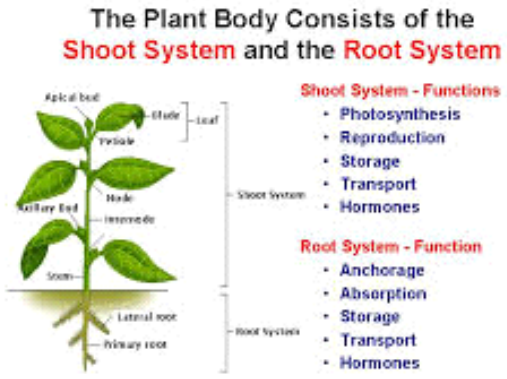
1. It supports the leaves, flowers and fruits and connects them with the roots. In trees and shrubs, the main stem or trunk provides a strong columnar structure from which branches are attached, raising the leaves upward to be exposed more fully to the sun.

2. It conducts water, nutrients and the products of photosynthesis to and from roots and leaves. It accommodates the transport system which is necessary for the vertical and lateral movement of water and sap within the plant body.

3. It helps store water, as in cacti, and the products of photosynthesis, as in the trunk of sago palm and sweet palm which store large stock of starch.

4. Young green stem also performs a minor role in the production of food through the process of photosynthesis, but in some species (e.g. cactus) the stem is the chief photosynthesizing organ.

5. The plant stem serves as a means of asexual reproduction in many plant species.



Plant Morphology

Leaves

Leaves are the original solar panels, capturing energy from sunlight in a biochemical process called photosynthesis. The cells within leaf tissues are hectic with biochemistry, importing water and nutrients to support their frantic work, and exporting sugar to provide energy to the remainder of the plant. The import/export business conducted by the leaves is supported by xylem and phloem pipelines, which explains why leaves are so richly veined. The leaves are the

sites of food production for the flowering plant. It is here that the plant acquires light energy and carbon dioxide for photosynthesis and releases oxygen into the air.

Leaves can have various shapes and forms, but they all basically consist of a blade, veins, and a petiole. The blade is the flat extended part of the leaf. The veins run throughout the blade and provide a transport system for water and nutrients. The petiole is a short stalk that attaches the leaf to the stem.

Functions of the Leaf

1. Photosynthesis: The process of producing food, known as photosynthesis, mainly occurs in the leaves of most angiosperms. This process essentially involves the absorption of light mainly by the chlorophyll pigments and the absorption of carbon dioxide via the stomatal pores in the leaves. As a result of the cleavage of the water molecule during photosynthesis, oxygen is generated and released to the atmosphere.

2. Transpiration: Plants lose a large volume of water through the leaves in the form of vapor. The exit of water is through the stomata and the cuticle, but stomatal transpiration is largely more dominant than circular transpiration. It is estimated that the loss of water via stomata through the process of transpiration exceeds 90 percent of the water absorbed by the roots.

3. Floral Induction: The plant leaves synthesize and translocate the flower-inducing hormone called florigen to the buds.

4. Food Storage: The leaves serve as food storage organ of the plant both temporarily and on long-term basis. Under favorable conditions, the rate of photosynthesis may exceed that of translocation of photosynthates towards other organs. During the daytime, sugars accumulate in the leaves and starch is synthesized and stored in the chloroplasts. At night time, the starch is hydrolyzed to glucose and respired or converted to transportable forms like sucrose.

Flower

Another component of the shoot system of a flowering plant is the flower. The flower is responsible for seed development and reproduction. There are four main flower parts in angiosperms: sepals, petals, stamens, and carpels. The stamen is considered the male portion of a plant and the carpel is considered the female portion.

Sepal – green, leaf-like structure that protects the budding flower.

Petal – colorful and often scented part of the flower that attracts insects.

Stamen – the part of the flower that produces pollen. Consists of a filament and an anther.

Anther – sac located at the tip of the filament that contains pollen.

Filament – stalk that connects to and holds up the anther.

Carpel – consists of the stigma, style, and ovary.

Stigma – the tip of the carpel that is sticky in order to collect pollen.

Style – the slender, neck-like portion of the carpel that leads to the ovary.

Ovary – structure at the base of the carpel that houses the ovule or egg.

When the ovule becomes fertilized, it develops into a seed. The ovary, which surrounds the seed, becomes the fruit.

Flowers that contain both stamens and carpels are called perfect flowers. Flowers that are missing either stamens or carpels are called imperfect flowers.

If a flower contains all four main parts (sepals, petals, stamens, and carpels), it is called a complete flower.

ASSESSMENT

Use the following options to fill the correct answers

Style, Ovary, Stigma, Filament, Carpel, Anther, Stamen, Petal, Sepal

1. ____ is the slender, neck-like portion of the carpel that leads to the ovary.
2. ____ is the stalk that connects to and holds up the anther.
3. ____ is the colorful and often scented part of the flower that attracts insects
4. ___ _ houses the stigma, style, and ovary.
5. _____ is the part of the flower that produces pollen. Consists of a filament and an anther.
6. ___ is not a function of the leaf in plants

a. Transpiration

b. Floral initiation

c. Photosynthesis

d. Food storage

7. ____ is not a function of plant root system

a. Aeration

b. Support

c. Transpiration

d. Reproduction

Answers

1. Style
2. Filament
3. Petal
4. Carpel
5. Stamen
6. B
7. C

Week 6

Topic: CROP PLANT FORM II

Contents:

- Meaning of Pollination
- Fertilizer
- Pollination

Pollination is the process by which pollen is transferred from the anther (male part) to the stigma (female part) of the plant, thereby enabling fertilization and reproduction. This takes place in the angiosperms and flower-bearing plants.

What is the function of pollination?

Like humans, many plants require a male element and a female element to "breed" or produce a new seed. The difference is that plants possess both the male element and the female element in the same flower. The male is the anther which produces a powder or dust called pollen and the female is called pistil which produces eggs. At the base of the female part pistil, there is the sweet nectar that pollinators like bees love. We need bats, beetles, birds, wasps, moths, butterflies, flies, and our beloved bees to produce 90% of the crops that flourish and one-third of everything we plant to eat.

Pollinators go from flower to flower in search of more sugar. The pollen must find its way down to a pistil to reach the egg to make a new seed.

The function of pollination is to make seeds!

Fertilizer

Fertilizers enhance the growth of plants. This goal is met in two ways, the traditional one being additives that provide nutrients. The second mode by which some fertilizers act is to enhance the effectiveness of the soil by modifying its water retention and aeration. This article, like most on fertilizers, emphasizes the nutritional aspect. Fertilizers typically provide, in varying proportions

three main macronutrients: **nitrogen (N), phosphorus (P), potassium (K);**

three secondary macronutrients: **calcium (Ca), magnesium (Mg), and sulfur (S);**

Micronutrients: **copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn), boron (B), and** of occasional significance there are **silicon (Si), cobalt (Co), and vanadium (V) plus rare mineral catalysts.**

Fertilizers enhance the growth of plants. This goal is met in two ways, the traditional one being additives that provide nutrients. The second mode by which some fertilizers act is to enhance the effectiveness of the soil by modifying its water retention and aeration properties. This article, like most on fertilizers, emphasizes the nutritional aspect fertilizers typically provide, in varying proportions.

ASSESSMENT

1. What are the three main macronutrients in fertilizer?
2. Name three micronutrients
3. What is pollination?
4. State two functions of fertilizers?
5. What is the main function of pollination

Answers

Nitrogen (N), Phosphorus (P), Potassium (K);

Copper (Cu), Iron (Fe), Zinc (Zn)

Pollination is the process by which pollen is transferred from the anther (male part) to the stigma (female part) of the plant, thereby enabling fertilization and reproduction

To enhance the growth of plants

To enhance the effectiveness of the soil by modifying its water retention and aeration properties.

The main function is to make seeds

Week 7

Topic: CROP PLANT FORM (Monocotyledon and Dicotyledon)

Contents:

Monocotyledons

Cotyledon means natural leaf borne of a seed of a plant, it is also known as seed leaf.

Monocotyledons also are known as monocots are plants with only one cotyledon or seed leaf. Examples are cereals like maize, sorghum, wheat, millet, barley, and grasses etc.

Features

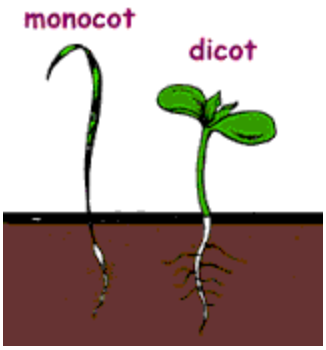
They possess one seed leaf, fibrous root system, parallel aeration, long and narrow leaf, non scented dull flower etc.

Dicotyledons

The dicotyledons, also known as dicots, is one of the two groups into which all the flowering plants or angiosperms were formerly divided. The name refers to one of the typical characteristics of the group, that is, the seed typically has two embryonic leaves or cotyledons. There are about 200,000 species within this group. Examples are legumes such as cowpea, groundnut tree, cocoa, fruit crops – orange, guava, vegetables – tomatoes and pepper.

Features

Dicotyledons plants have two seed leaves, tap root system, leaf stalk or petiole, epigeal germination, colorful scented flowers.



Monocot and Dicot

Differences between Monocotyledons and Dicotyledons

MONOCOTS	DICOTS
Embryo with a single cotyledon	Embryo with two cotyledons
Pollen with single furrow or pore	Pollen with three furrows or pores
Flower parts in multiples of three	Flower parts in multiples of four or five
Major leaf veins parallel	Major leaf veins reticulated
Stem vascular bundles scattered	Stem vascular bundles in a ring
Roots are adventitious	Roots develop from radicle
Secondary growth absent	Secondary growth often present

Number of cotyledons — The number of cotyledons found in the embryo is the actual basis for distinguishing the two classes of angiosperms and is the source of the names Monocotyledonae ("one cotyledon") and Dicotyledonae ("two cotyledons"). The cotyledons are the "seed leaves" produced by the embryo. They serve to absorb nutrients packaged in the seed until the seedling is able to produce its first true leaves and begin photosynthesis.

Pollen structure — The first angiosperms had pollen with a single furrow or pore through the outer layer (monosulcate). This feature is retained in the monocots, but most dicots are descended from a plant which developed three furrows or pores in its pollen (triporate).

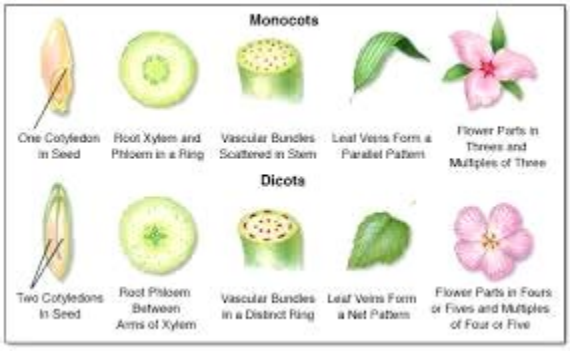
Number of flower parts — If you count the number of petals, stamens, or other floral parts, you will find that monocot flowers tend to have a number of parts that is divisible by three, usually three or six. Dicot flowers, on the other hand, tend to have parts in multiples of four or five (four, five, ten, etc.). This character is not always reliable, however, and is not easy to use in some flowers with reduced or numerous parts.

Leaf veins — In monocots, there are usually a number of major leaf veins which run parallel the length of the leaf; in dicots, there are usually numerous auxiliary veins which reticulate between the major ones. As with the number of floral parts, this character is not always reliable, as there are many monocots with reticulate venation, notably the aroids and Dioscoreales.

Stem vascular arrangement — Vascular tissue occurs in long strands called vascular bundles. These bundles are arranged within the stem of dicots to form a cylinder, appearing like a ring of spots when you cut across the stem. In monocots, these bundles appear scattered through the stem, with more of the bundles located toward the stem periphery than in the center. This arrangement is unique to monocots and some of their closest relatives among the dicots.

Root development — In most dicots (and in most seed plants) the root develops from the lower end of the embryo, from a region known as the radicle. The radicle gives rise to an apical meristem which continues to produce root tissue for much of the plant's life. By contrast, the radicle aborts in monocots, and new roots arise adventitiously from nodes in the stem. These roots may be called prop roots when they are clustered near the bottom of the stem.

Secondary growth — Most seed plants increase their diameter through secondary growth, producing wood and bark. Monocots (and some dicots) have lost this ability, and so do not produce wood. Some monocots can produce a substitute, however, as in the palms and agaves.



Monocots/Dicots

ASSESSMENT

1. What are monocotyledons?
2. State two differences between monocotyledons and dicotyledons
3. Give two examples each of monocot and dicot plants
4. Cotyledon means _____
5. State the features of dicotyledons

ANSWER

1. Monocotyledons also are known as monocots are plants with only one cotyledon or

seed leaf.

2. Monocotyledons have Embryo with a single cotyledon and their stem vascular bundles scattered, while dicotyledons have Embryo with two cotyledons and their stem vascular bundles in a ring.

3. Examples of monocots are cereals like maize, sorghum and examples of dicots are legumes such as cowpea, groundnut tree.

4. Cotyledon means natural leaf borne of a seed of a plant.

5. Dicotyledons plants have two seed leaves, tap root system, leaf stalk or petiole, epigeal germination, colorful scented flowers.

Week 8

Topic: CONSTRUCTION OF VEGETABLE BEDS

Contents:

- Meaning of Nursery
- How to Construct Vegetable Beds

A. Introduction: Nursery

A nursery is a place where seedling (young crops) are intensively raised and taken care of before they are transplanted to the main field. A nursery is also a place where plants are propagated and grown to usable size. A nursery bed is a specially prepared portion of land put aside for raising seedlings. It acts as a temporary home for young plants until they are eventually planted in a permanent garden.

Seeds which need extra care should be grown in a nursery. Also, it is less costly to sprout your own plants especially vegetable ed to make a nursery bed. Nurseries can grow plants in open fields, on container fields, and in tunnels or greenhouses. In open fields, nurseries grow ornamental trees, shrubs, and herbaceous perennials, especially the plants meant for the wholesale trade or for amenity plantings. On a container field, nurseries grow small trees, shrubs, and herbaceous plants, usually destined for sales in garden centers. Nurseries also grow plants in greenhouses, a building of glass or in plastic tunnels, designed to protect young plants from harsh weather (especially frost), while allowing access to light and ventilation. Modern greenhouses allow automated control of temperature, ventilation and light, and semi-automated watering and feeding. Some also have fold-back roofs to allow “hardening-off” of plants without the need for manual transfer to outdoor beds.

Crops that need to be raised in the nursery are

- Vegetables like tomatoes, pepper, cabbage e.t.c
- Tree crops e.g mango, oil palm, citrus, cocoa, rubber e.t.c
- Ornamental crops e.g rose, cotton, hibiscus e.t.c

Nursery practices

These include:

- Selection of a suitable site

- Containers for seedlings and soil collection
- Watering
- Thinning
- Supplying
- Weeding
- Mulching
- Pest control
- Fertilizer application
- Transplanting

B. How to Make a Vegetable Nursery Bed

- Site selection

The nursery should:

- Be located near the planting site so that the transplants can be taken to the main garden without any damages that may be involved due to long distance.
- Be located Near a water source because irrigation may be necessary
- Not be located on a slope unless it is terraced since this may lead to erosion.
- Face the direction where the sun comes from as crops need sunlight for better growth
- Not to be located in a waterlogged or marshy area
- Preparation of the Establishment
- All weeds and grasses must be thoroughly cleared
- Measure one meter wide of any convenient length
- Dig it well
- Fertilize every three meters square with one wheelbarrow of compost and sand to make a seven cm layer
- Water the bed.
- Planting seeds

- Seeds should be planted in rows
- The lines must face where the direction of the sun
- Make the lines at a spacing of 12cm – 15cm apart
- Use a string to make straight lines
- The line must be about 2cm – 3cm deep.
- The size of the seed is the size of the soil you put or cover the seed with
- Mulch the bed with dry grass, then water it using a watering can with a nozzle on it

Germination

- The seeds will start germinating after 5 – 7 days
- Remove the grass and then put a shade over the bed
- The bed is 1 m high, cover it with grass but let some sunlight go through

Watering

Water the bed whenever it is necessary

Avoid overwatering the nursery bed for it can cause stress and compaction

Results of Water stress

- Slows down photosynthesis
- Causes Wilting
- Prevents adequate transport of nutrients all around the plants

Results of Overwatering

- Compaction and suffocation
- Creates a swampy or marshy environment
- Also prevents transportation of nutrients
- Leaching of nutrients from the soil

Maintenance

- Mulch the seedbed
- Provide enough shade for the crops
- In case of no or limited rain, provide water at dawn and dusk
- Thin the crops properly
- Remove weak seedlings and plant them in another bed

Transplanting

Seedlings will be ready for transplanting within 21 –30 days. To remove the shade a day before transplanting as this gives the seedling chance to get used to the strong sunshine. This term is referred to as hardening. Reduce water at this stage

- Transplanting should be done early in the morning or late in the evening (from 5 am – 10 am or 4 pm – 6 pm)
- Spacing will depend on the type and variety of the vegetable that has been planted
- Water the plants as soon as transplanting is done if planting has not been done during a rainy season.
- Protect young crops from animals like pigs by placing dry thorn tree branches around the garden

Instruments needed in making a Nursery Bed

- Fork: For removing any unwanted materials from the garden
- Hoe: Used for tilling and removal of weeds
- Spade: For carrying soil
- Rake: Used to remove any unwanted rubbish
- Water can: For watering the plants
- String and Sticks: For measuring to ensure correct and proper spacing

Vegetable Bed

ASSESSMENT

1. A ____ is a place where seedling (young crops) are intensively raised and taken care of before they are transplanted to the main field.

2. Seedlings will be ready for trans-planting within ___ days

a. 11 – 20

b. 21 –30

c. 11 – 15

d. 20 – 30

3. List 4 Nursery practices

4. Name 3 instruments needed in making a nursery bed

5. What kind of Crops need to be raised in the nursery?

Answers

1. Nursery
2. B
3. Watering, Thinning, Supplying, Weeding, Mulching, Pest control
4. Fork, Hoe, Spade, Rake.
5. Vegetables, Tree crops, and Ornamental Crops

Week 9

Topic: Agricultural Importance of Farm Animals

Food – farm animals such as cattle, goat, sheep are used as food through the provision of meat and milk while poultry provides egg and meat. Fish is another source of protein

Income – Farm animals are sold to generate income

Employment – Many people take up production of farm animals as full time employment

Foreign Exchange – Surplus production of farm animals can be exported to other countries

Farm Power – Some farm animals are used as a source of farm power on the farm. Examples are bulls, cattle, bullocks

Clothing Materials – The hides and skins of animals are used to make clothes, leather shoes and blankets

Manure – Animal dungs and dropping are used as manure

Animal Feed – The blood and bones of slaughtered animals can be dried and used to make feeds

Assessment

1. Mention 5 importance of farm animals

ANSWER

Food – farm animals such as cattle, goat, sheep are used as food through the provision of meat and milk while poultry provides egg and meat. Fish is another source of protein

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JSS 1

AGRICULTURAL SCIENCE

SECOND TERM

TABLE OF CONTENT

Week 1

Topic: CLASSIFICATION OF CROPS BASED ON LIFE CYCLE

Classification of Crops based on Life cycle and Uses

Crops plants are classified based on three criteria which are;

Botanical classification – Based on generic and specific names

Agricultural classification – Based on the uses or important of crops to man and animals

Classification based on life cycle – Based on numbers of year or season from germination to harvesting or death.

General Classification of Plants

1. By Growth habit:

Succulent plants – herbaceous or herbs (succulent seed plants possessing self-supporting stems)

Vine – a climbing or trailing herbaceous plant (Liana – a climbing or trailing woody plant)

Trees – having a single central axis

Shrub – having several more or less upright stems

2. By Leaf drops:

Deciduous – no living leaves during dormant (winter) season (apple)

Evergreen – retaining functional leaves throughout the year (spruce)

3. By Life span:

Annuals – plants that normally complete their life cycle during a single growing season (lettuce, spinach, marigold)

Biennials – plant that normally completes its life cycle during a period of two growing seasons (celery, carrot)

Perennials – plants that grow year after year, often taking many years to mature.

4. By Temperature tolerance:

Tender plant – damaged or killed by low temperature

Hardy plant – withstands winter low temperatures

Wood hardy – a whole plant is winter hardy

Flower-bud hardiness – ability of flower buds to survive low winter temperatures (peach, ginkgo tree)

5. By Temperature requirements:

Cool-season crop – prefers cool temperatures (peas, lettuce)

Warm-season crop – prefers warm temperatures (tomato, pepper)

6. By Habitat or Site preference:

Xerophyte – prefers dry sites

Shade plants – prefers low light intensity

Acid loving – prefers low pH soils

Halophyte – prefers salty soils

Plant crops are grouped into three categories according to their life cycles such as;

I) Annual Crops

From the name it is clear that the plants live for one season or less. They complete their life cycle once in a year or a growing season; during which the vegetative and reproductive stages are completed e.g. maize, rice, cowpea, millet, vegetables, cotton, groundnut, etc. Annual plant is one which completes its life cycle from germination to seed formation within one season and then dies usually as a result of complete exhaustion of its food reserve in the process of reproduction. They comprise of several of most beautiful and easily grown plants, widely varying in from habit of growth and colour. Annuals are very effective, grown neither in pots nor in ground. Particular annuals thrive best in particular period of the year. The annuals are conveniently grouped according to season as follows.

1. Rainy Season Annuals: They can stand more in rain than others and therefore grown to flower during rainy season. The time of sowing then would be from April to May in most places e.g. Mary gold, Aster, Zinnia etc.

2. Winter or Cold Season Annuals: The thrive and bloom best during winter. These are sown in September, October e.g. phlox, Antirrithium.

3. Hot weather or Summer season Annuals: They are sown in January – February and

blooming period is April, May e.g. Sunflower and Zinnia.

II) Biennial Crops

They complete their life cycle once in two years or two group seasons. In the first year, they undergo the vegetative stages where leaves and roots are produced in abundance, the plant also elongates. But during the second year, the plants undergo reproductive stages where flowers, fruits and seeds are produced e.g carrot, lettuce, cabbage, ginger, cassava, etc. These plants usually requires two years or at least two growing seasons with more or less of a dominant season or lasting season between two completed life cycle. Seed sown in spring or summer, and vegetative growth is completed in first year and in the following spring, flowering and fruiting takes place. Generally the period of growth is 6 to 9 months e.g. Gladioli, Dahlia. No hard and fast line can be drawn between annuals and biennials crops like turnip, carrot, cabbage and onion are classified as biennials.

III) Perennial Crops

Any plant that lives more than two years is a perennial e.g. Mango, Citrus. They complete their life cycle once in three years. In the first two cycles once in three years, they undergo vegetative stages while in the last years, the reproductive stages are completed e.g. rhizome, sugarcane, banana, plantain. A perennial plant that can survive for thirty years and above is called permanent crop e.g. cocoa, kola, mango, oil palm, rubber, coconut, etc.

<u>These crops are classified in to two groups.</u>

i) Herbaceous:

Herbaceous perennials are those with more or less soft succulent stems. In Temperate climates the tips die off after seasons growth but root remains alive and produce new stem and tops on favorable conditions. In other words their tips are annual while ground parts are perennials lie many years and are classified as: a) Trees b) Shrubs c) Vines according to their habit of growth.

a) Trees: Trees are upright in habit and stems take the form of central axis e.g. Mango, guava, Mandarins etc.

b) Shrubs: Shrubs have no main trunk but a number of erect or semi erect stems are seen but do not forms the main frame work e.g. Hibiscus, Rose etc.

c) Vine: Both woody and herbaceous have stems which are flexible and not in position to keep their branches and leaves erect. They either spread on the ground or require some support whether alive or man-made e.g. Grape vines, Passion fruit etc.

<u>Agricultural Classification or classification based on the uses of crops:-</u> In this category crops are classified into the following groups, legumes, cereals, spice, latex, beverages, fibre.

IV) Ephemerals: They are crops that complete their life cycle once in three or four months

and can undergo two or three life cycles in a year e.g. tomato

Classification Based on Uses

Food Crops – These are crops used by man for food. They are sub-divided into various groups

Cereal Grains – They are grass crops grown for their seeds or grains which are rich in carbohydrate e.g maize, rice, millet, wheat, sorghum and barley

Grain Legumes – They supply proteins in the food of man. E.g cowpeas, soyabeans, groundnut, pigeon peas.

Root Crops – These are crops grown mainly for food stored in the swollen roots. They are the major sources of carbohydrate e.g cassava, carrots

Tuber Crops – They are underground stems which are enlarged to store food in form of carbohydrtes e.g. cocoyam, yam, irish potatoes

Vegetable Crops – Crops grown for their leaves of fruits. The leaves or fruits are eaten fresh or cooked. They supply mainly vitamins and minerals.

Fruits – Crops with succulent fruits which are eaten fresh. They can supply vitamins and minerals and sometimes carbohydrates. e.g are mango, banana, citrus, cashew, pawpaw

Beverages – they are crops whos products are used for making food drinks (bournvita and mila) or making non-alcoholic drinks. These crops are cocoa, coffee

Spices – these are crops used to add special taste or flavour to food e.g. castor, ginger, garlic

Oil Crops – These crops produce seeds or fruits from which we extract oil. They are the major source of oil used for cooking e.g groundnut oil, soya oil, shea butter, coconut oil

Fibre Crops – These are crops grown especially for their fibre. Fibres are used for making carpets, sacks, ropes. Fibres may be produced from stem or leaves or fruits and seeds. Examples are cotton, jute, kenaf, hemps, raffia.

Forage crops – These are crops grown mainly for feeding farm animals. Examples are elephant grass, guinea grass, centrosema, and some food crops such as millets, sorghum, cowpea and groundnut.

Latex Crops – These are crops whose stem or leaves produce sap which maybe used as gum or coagulated to form rubber. e.g gum arabica, para rubber

Drug Crops and Stimulants – Crops used for making medicines or for their stimulating effects. Examples are tobacco, cocaine, quinine, kolanut, eucalyptus

Ornamental Crops – Crops grown for purpose of making our environment beautiful e.g. barbados, lily, marigold, hibiscus, zinnia.

Classification Based on Food Nutrient

As source of carbohydrates – Yam, maize, Millet, cassava, potatoes

As source of protein – Beans, groundnut, soyabeans, pigeon peas

As source of fats and oil – castor oil, melon, palm tree, groundut

As source of minerals – Calcium. potassium, iodine, managanese, iron, sodium chloride are the examples of nutrients which can be supplied. example of such crops are fresh vegetables, apple, pineapple

As source of vitamins – Vegetables, orange, cabbage, carrot, soya beans

Assessment

Section A – Use the options below to answer the following questions

1. Latex, Forage, Oil, Biennial, Perennial, Fibre, Spice, Cereal grain, Root, Halophyte, Drug, Ornamental, Ephemeral, Annual, Xerophyte, Tuber
2. ____ crops complete their life cycle once in two years or two group seasons
3. ____ crops are crops that complete their life cycle once in three or four months and can undergo two or three life cycles in a year
4. _____ crops are crops whose stem or leaves produce sap which maybe used as gum or coagulated to form rubber
5. _____ crops are underground stems which are enlarged to store food in form of carbohydrtes
6. ____ crops are crops that produce seeds or fruits from which we extract oil.
7. Any plant that lives more than 2years is a _____ crop
8. ____ crops are grown for the purpose of making our environment beautiful
9. ____ plant prefers salty soils
10. _____ are crops used to add special taste or flavour to food
11. ___ crops are used for making medicines or for thir stimulating effects

Section B – Categorise the following crops according to the options given below

Latex crop, Forage crop, Oil crop, Biennial crop, Perennial crop, Fibre crop, Spice , Cereal grain, Root crop, Halophyte, Drug crop, Ornamental crop, Ephemeral crop, Annual crop,

Xerophyte, Tuber crop, Beverage,

1. Mango
2. Yam
3. Ginger
4. Shea butter
5. Cocoa
6. Hibiscus
7. Quinine
8. Carrot
9. Maize
10. Tomato

Section C

1. Give 2 examples each of annual, biennial, perennial crops
2. Give 2 examples of classifications of plant crops.

Answers – Section A

1. Biennial
2. Ephemeral
3. Latex
4. Tuber
5. Oil
6. Perennial
7. Ornamental
8. Halophyte
9. Spice
10. Drug

Answers – Section B

1. Mango – Perennial
2. Yam – Tuber crop
3. Ginger – Spice
4. Shea butter – Oil crop
5. Cocoa – Beverage
6. Hibiscus – Ornamental crop
7. Quinine – Drug crop
8. Carrot – Biennial crop
9. Maize – Annual crop
10. Tomato – Ephemeral crop

Week 2 & 3

Topic: Classification of Farm Animals

Introduction

Animals are those group of living things which depend mainly on plants for their food. They are found in tropics as well as in the temperate regions on the land, in the forest and salt water.

Classification of Farm Animals

Classification is based on the following:

- On the basis of size
- According to their Habitat
- According to their mode of reproduction
- According to their type of Stomach

Classification According to Size

On the basis of size, farm animals can be broadly classified into two – large and small animals. Large animals are farm animals which are relatively big in size e.g cattle, sheep, goats, pigs. Small animals are small in size e.g crab, crayfish, mice, periwinkle.

Classification According to Habitat

Farm animals can be classified into two: land (terrestrial animals) e.g cattle, goats, pigs, sheep, horse, fowl, rabbits and donkeys and aquatic animals e.g. fish, crab, oyster, lobster, octopus, periwinkle.

Classification According to Mode of reproduction

This can be classified to animals that give birth to their young ones alive and animals that lay eggs. Animals that give birth to their young ones alive and feed them with milk from their mammary glands. e.g cattle, sheep, goat. Animals that lay eggs ie non-mammals e.g. fish, reptiles and bird.

Classification According to the type of Stomach

Farm animals e.g mammals can also be classified according to the type of stomach they have. Some mammals have a complex stomach and are called ruminants e.g cattle, sheep

and goats. Other mammals have a simple stomach and are called non-ruminants e.g pigs, rabbits and guinea pigs. Ruminants have four stomach compartments which are rumen, reticulum, omasum and abomasum. Ruminant animals chew their cud as ingested food comes back to the mouth and the animal begins to chew again.

ASSESSMENT

1. Animals can be classified in 4 ways, list them.
2. On the basis of size, farm animals can be broadly classified into _____
3. Farm animals can be classified into two, which are _____
4. Mammals that have a complex stomach are called _____

ANSWER

(i) On the basis of size (ii) According to their Habitat (iii) According to their mode of reproduction (iv) According to their type of Stomach

Large and Small animals

Land and Aquatic Animals

Ruminants

Week 4 & 5

Topic: Characteristics of Selected Farm Animals

Types, Distribution and Uses of Farm Animals

Cattle

They are kept mainly for beef and milk production. There are different types of cattles and classification is based on their uses.

- Dairy cattle – Cattle kept for milk production. e.g White Fulani
- Beef cattle – Cattle kept for meat production. e.g. Sokoto Gudali
- Dual Purpose Cattle – Cattle kept for both milk and meat production. e.g. White Fulani and Kuri Dairy Breeds
- Long horned humped Zebu – White Fulani, Red Bororo, Jet Koram
- Short horned humped Zebu – Sokoto Gudali, Yola or Adamawa Beef Brands
- Long horned humpless cattle – Ndama, Kuri
- Short horned humpless cattle – Muturu, Ghana short horn

Terms used in describing cattle

- Bulls – Adult male cattle
- Cow – Adult female cattle
- Heifer – Female cattle
- Bullock – Castrated male cattle
- Calf – Young cattle
- Bull Calf – Male calf
- Heifer Calf – Female calf
- Calving or Parturition – Giving birth to a calf

- Dairy Cattle – Cattle kept solely for milk production
- Beef Cattle – Cattle kept solely for meat production
- Beef – Meat from cattle

Goats

One of the earliest domesticated animal. They are kept for milk and meat production.

Types of Goats

The Sokoto Red – Well defined breed with uniform red colour in both sexes.

- Kano Brown – Medium sized animal with brown colour
- Sahel Goat – Medium to large sized animal found in scanty vegetation
- Borno White
- West African Dwarf Goat

Terms used in describing Goats

- Billy – Adult male goat
- Nanny – Adult female goat
- Buck – Male goat of breeding age
- Doe – A female goat of breeding age
- Kid – A young goat of either sex
- Kidding – Process of giving birth
- Heat Period – Period in which the female is most likely to accept a male
- Oestrus Cycle – Time interval between heat periods
- Gestation – Period between conception and birth
- Lactation – Act of producing milk
- Udder – The mammary gland which produces milk
- Weaning – Stopping an animal from suckling the mothers milk
- Castrate – Castrated billy
- Herd – Group of adult goat

Sheep

They are hollow-horned , even-toed ruminants which are said to have probably originated from Iran or Iraq area.

Types of Sheep

Three well known breeds

1. The Ouda – The commonest breed. Rams have large, wide and spiral horns and ewe are polled (hornless). They have a characteristic long and pendulous ears with a distinct colour. They have long legs and long tiny tails. They are kept for meat production.
2. Yankasa – This breed is commonly found in North. The rams have long curved horns while ewes may have short horns or polled. They have moderately floppy ears. They are mainly kept for meat production.
3. West African Dwarf Sheep – This is smallest breed of sheep in West Africa. They are found in humid areas of West Africa. They have short horizontal ears with the males horned and females polled.

Terms used in describing Sheep

- Ram – Adult male sheep
- Ewe – Adult female sheep
- Gimmer – Young female
- Lamb – Young sheep of either sex
- Tupping – Act of mating Sheep
- Wether – Castrates male sheep
- Lambing – Process of giving birth to sheep
- Flock – Group of adult sheep

Poultry

Poultry refers to all domesticated bird raised for meat, eggs or feather. These include chicken, geese, ducks, guinea fowl, turkeys.

Types of Fowls

The Exotic Breeds

- The Leghorns – Originated from the Mediterranean region. they are kept for egg production. Two types, the brown and the white leghorn
- Rhode Island Red – Foreign breed from America. A dual purpose for meat and egg production. Eggs are large with brown shells
- Plymouth Rock – Kept for egg production
- New Hampshire – Dual purpose breed for egg and meat production

Local Breeds

Breed that resulted from crosses between two different breed commonly known as cross breed.

Terms used in describing chickens

- Cock – Adult male
- Hen – Adult female
- Cockerel – Young male
- Pullet – Young female
- Chick – Young chicken pf either sex
- Capon – Castrated chicken
- Treading – Mating of chickens
- In-lay – Pregnancy
- Parturition – Process of laying eggs
- Clutch – A group of young chickens
- Flock – A group of adult chicken

Factors affecting the Geographical distribution of Farm animal in Nigeria

1. Climate – Average weather conditions of a place. It includes factors such as rainfall, temperature, light, atmospheric pressure, relative humidity and wind. Climate to an extent determines the number of farm animals that can be distributed to an area.
2. Availability of Natural Pasture
3. Religious and Social Factor

Assessment

Use the following options to answer the questions below.

Heifer, Udder, Ewe, Capon, Beef cattle, Wether, Nanny, Buck, Gestation, Bullock, Ram, Parturition, In-lay, Lactation, Heat period, Kidding, Calf, Clutch, Diary cattle, Cow, Bull, Calf, Pullet, Weaning, Cockerel, Doe, Kid, Billy, Gimmer.

1. Cattle kept solely for milk production is called ____
2. ___ means giving birth to a calf
3. The act of mating in sheep is called ____
4. The period between conception and birth is called ____
5. A group of young chicken is called ___
6. Castrated male cattle is called ____
7. The mammary gland which produces milk is called ____
8. A young female chicken is called ____
9. A young female sheep is called ___
10. Young cattle is called ____
11. A castrated chicken is called ____
12. Mating in chicken is referred to as ___
13. Period in which the female is most likely to accept a male is called _____
14. The process of giving birth is called ____
15. Castrated male sheep is called ____

Answers

1. Diary Cattle
2. Parturition
3. Tupping
4. Gestation
5. Clutch
6. Bullock

7. Udder
8. Pullet
9. Gimmer
10. Calf
11. Capon
12. Treading
13. Heat period
14. Kidding
15. Wether

Week 6 & 7

Topic: Method of Weeds and Pest Control

Weeds

A Weed is any plant that grows in a place where it is not expected to grow or plant which grows out of place. A weed is a plant considered undesirable in a particular situation, "a plant in the wrong place". Weed is any plant that grows in a place where it is not expected to grow or a plant which grow out of place. Such a plant constitutes nuisance either to man, livestock or plants.

Characteristics of weeds

1. Weed has the ability to regenerate itself – They are difficult to eradicate because of their regenerative feature
2. Weed produce many seeds which are easily dispersed
3. High resistant capacity – They are capable of withstanding very adverse weather conditions because of their tough protective seed coats
4. Weed has the ability to establish easy-grow faster than crop plants – weeds possess highly competitive and aggressive growth habit that can easily smother crops if not removed on time
5. Weed has ability to survive under adverse climatic and soil conditions – persistent
6. Weeds have devices for easy dispersal – These include spines, hooks, parachutes, wings with which they can be easily dispersed. Examples of weeds are – tridax, goat weed
7. Weed has long period of viability

Uses of weeds

1. They act as cover crop to control soil erosion e.g centrosema, calopogonium, stylosanthes
2. Weed can be used as much and compost materials. Much helps to conserve soil moisture while compost is an organic manure which improves soil fertility.
3. Weeds are used for food by man e.g. African spinach
4. Weed roots help to bind the soil particles to getting thereby preventing erosion.

5. They are sources of feeds to livestock e.g guinea grass, elephant grass, sedge
6. Some weeds are medicinal in nature e.g lemon grass
7. Weeds are major source of ornamental crops e.g pride of barbados, rose, canalily, hibiscus
8. Some weeds can control soil erosion.
9. Some weeds are used for roofing and mat making.
10. Weeds are used for compost making.
11. Leguminous weeds harbour bacteria that help fix atmospheric nitrogen in the soil

Effect/Economic Importance of Weeds

- Weeds compete with crops for sunlight – Weeds are capable of producing many large leaves which may grow and cover other plants around it.
- Weed compete with crops for nutrients – The roots of weeds develop rapidly and remove considerable amount of nutrients from the soil
- Weeds harbour crop pest and diseases – Some weeds may harbour crop pests and diseases
- Weed compete with crop for soil moisture – Their roots are capable of developing fast and removing large portion of moisture
- Losses in crop yield
- Weeds compete with crop for soil oxygen
- Some weeds act as parasites of crops and may kill their hosts e.g striga, dodder, mistletoe
- Losses in quality of crops
- Losses in income to farmers – The low yield coupled with the reduction in quality of produce affects the income of farmers.
- Some weeds are toxic to farm animal
- They increase the cost of production

Classification of weeds

1. Based on habitat (i) aquatic weed e.g water hyacinth (ii) terrestial weed e.g goat weed, tridax (iii) epiphytic (grow on other plants) e.g striga, dodder.

2. Based on life cycle (i) Annual (one year life span) goat weed (ii) Biennial weeds (2 years life span) e.g morning glory wild carrot.
3. Perennial (more than 2 year – life span) – elephant grass, sida acuta, spear grass.
4. Based on the type of leaves (i) broad leaf grasses

Methods of weed control

Physical (mechanical) method

1. Hoeing – use of hoe to remove the weeds from the roots
2. Hand pulling – hand is used to pull out the weeds
3. Slashing – using cutlass to cut the shoot of weeds
4. Use of plough – uproot and bury the weed
5. Rogueing

Cultural method

1. Mulching – Mulch are spread on flat and to suppress weeds and prevent them from sprouting.
2. Flooding- water is led to the farm land to kill the weeds
3. Burning – the vegetation crop residue is set on fire to kill the weed seeds
4. Cover cropping – Fast growing legumes are planted to another weed
5. Crop rotation – It is effective for controlling weeds associated with specific crop – the weed starve to death.
6. Close spacing
7. Closed season

Biological Method- use of living organisms to control weeds

1. Use of parasites and predators to control weeds
2. Legume can be used to smoother weeds
3. Some animals like cattle, sheep can also feed on weeds
4. Insects can be used to kill some weed e.g cactoblastic is used to destroy cactus weed.

Chemical method

This involves the use of herbicides to destroy weed. Herbicides are chemical substances that can kill weeds.

Assessment

1. A ___ is any plant that grows in a place where it is not expected to grow or plant which grows out of place.
2. Mention 4 cultural methods of weed control and explain 2.
3. List three uses of weeds

Answers

1. Weed

2. Mulching – Mulch are spread on flat and to suppress weeds and prevent them from sprouting

Flooding- water is led to the farm land to kill the weeds

Burning – the vegetation crop residue is set on fire to kill the weed seeds

Cover cropping – Fast growing legumes are planted to another weed

Crop rotation

3. Weed roots help to bind the soil particles to getting thereby preventing erosion.

They are sources of feeds to livestock e.g guinea grass, elephant grass, sedge

Some weeds are medicinal in nature e.g lemon grass

Weeds are major source of ornamental crops e.g pride of barbados, rose, canalily, hibiscus

Some weeds can control soil erosion.

Some weeds are used for roofing and mat making.

Weeds are used for compost making.

Week 8 & 9

Topic: Weeds(II)

Methods of dispersal of weeds

1. By wind – The fruits and seeds of many weeds are carried by winds and they are spread from one place to another
2. By Animals – Animals like rabbits, rats, squirrels and man are involved in the dispersal of weed seeds. Animal dispersed seeds usually have sticky fruits or seeds which may adhere to the coat of the animal and they are carried from one place to another
3. By Water – Seeds of weeds may fall into water and are thus transported as the water carries it along as it moves.

Examples of Common Weeds

1. Common Name: Spear grass

Botanical Name: Heteropogoncontorous

Family: Poaceae

Habitat: They grow on poor soil as well as soil with high acidity.

Description of Characteristics:

They are cool seasoned tufted perennial grasses

The foliage grows from 10 -20cm high.

Most species flowers in spring.

Common Name: Day flower

2. Botanical Name: Commelina communis

Family: Commelinaceae

Habitat: It strives in edges of garden and yards, fence row; vacant lots and waste areas.

Description of Characteristics:

- It is about 1-3m long

- It can be erect or spraw across the ground like vine .
- The round stems are smooth and hairless.
- Their margins are smooth and veins runs parallel to each other .
- Upper edge of the sheath is usually hairless.
- Each flower blooms during the morning for a single day.

3. **Common Name:** Elephant grass

Botanical Name: Pennistrum purpureum

Family: Poaceae

Habitat: It is found on wide range of soils.

Description of Characteristics:

- It is a tall grass.
- It grows in dense clumps of up to 10 feet tall.
- In the savannah of Africa, it grows along lake beds and rivers where the soil is rich.
- They are yellowish or purple in colour .
- The stems are coarse and hairy
- The leaves are 2-3 feet long
- The edges of the leaves are razor sharp.

3. Common Name: Turbina

Botanical Name: Turbina corymbosa

Family: Convolvulaceae

Habitat: It grows along rainforest margins and water ways

Description of Characteristics:

- It is a scrambling vine growing to at least 8 meters in height.
- Its leaves are heart shaped.
- It produces many branched flowers.

Classification of herbicides

1. Based on mode of action (i) selective herbicide – kill a particular type of weed e.g 2,4-D used in grassy/monocot plants (maize farm. Fusillade super used in cowpea farm.
2. Non-selective herbicide – kill both broad leaf and narrow leaf weeds e.g paraquad, gramoxone, round up.
3. System – active ingredient goes from the root into the weed system and kills it. e.g Primextra, alachor, fusillade super.
4. Contact herbicides – has immediate effect on the weeds upon contact with thin e.g paraquat, diquat, gramoxone.

Time of application of herbicides

Pre-plant herbicides – applied before seed are planted.

Pre-emergence herbicides – applied before planted seeds emerge e.g Galex for maize, Diurron for cassava.

Post emergence herbicides- applied after the emergence of both crops and weeds. Post – emergence herbicides are context in action.

Benefits of herbicides

– Easy to apply

– Fast in action

– Cover large area of land

– Saves labour

Disadvantages of using herbicides

– Some beneficial organisms may be killed

– They are poisonous to man and animals

– Air, water and soil are polluted

– Requires technical knowledge

Integrated Control Method: Combination of two or more of the methods discussed.

Effects of cultural control method

– Fire may kill beneficial organisms

– Burning may be difficult to control

– Fire destroys organic matter

– Tillage operations destroy soil structure that may lead to erosion

Effects to biological control

– Predators may later feed on the crops

– Introduced plant may be difficult to be controlled

Wind dispersal methods

- By wind

– Seeds are very small and light

– Possession of pappus hours e.g Emilic

– Possession of parachute – e.g Tridax

– Some seeds are fluffy outgrowth – e.g Cotton

- By Man/Animal

– Some are edible, pass through the alimentary canal and deposited in soil

– Some posses adhesive hook e.g desmodium, Boerharia diffusa

- By water

– Water proof epicarp and light e.g cocoanut from seeds of some legumes and grasses.

- Explosive Mechanism

– Dry pod of weed Sph+ open and throw the seeds to some distance e.g water leaf para rubber, calopogonium, puerana, centrose sida acuta

– Farm tools – Tools and equipment such as cutlass, plough may have seed of weed stuck on them. If not cleaned properly before use may transfer seeds of weeds to new areas.

Assessment

1. When should herbicides be applied to control weed?
2. Name 3 methods by which weeds can be dispersed?
3. List 2 disadvantages of using herbicides
4. List 2 effects of cultural control of weeds

Answers

1. Before seeds are planted

Before seeds emerge

After crops and weeds emerge

2. By Winds, Animal and Water

3. Some beneficial organisms may be killed

They are poisonous to man and animals

Air, water and soil are polluted

Requires technical knowledge

4. Fire may kill beneficial organisms

Burning may be difficult to control

Fire destroys organic matter

Tillage operations destroy soil structure that may lead to erosion

JSS 1

AGRICULTURAL SCIENCE

THIRD TERM

TABLE OF CONTENT

Week 1

Topic: Pests of Crop Plants and Control

Effect or Economic importance of insect pests in crop production

- They destroy crop by biting, chewing, piercing and defoliation activities
- Reduction in farmer's profit.
- Some insects are disease carriers.
- Increased rate of crop production
- Reduction in the viability of stored produce
- They can cause total death of crops
- Spot of injuries by insect may predispose crop to disease attack
- They render farm products unattractive and unmarketable

Prevention and Control of Pests

Pest control can be done via 3 methods – physical, chemical and cultural.

Physical Control – This involves the removal of insect by

- hand picking of insects and larvae
- setting traps to catch rodents
- shooting rodents with gun
- fencing round the farm with wire nets

Cultural Control – This method involves the use of farm practices to prevent or control pests especially on the field. Examples of cultural control include

1. Bush fallowing
2. Crop rotation change in the time of planting
3. Regular weeding
4. Proper timing of planting
5. Use of pest resistant varieties
6. Burning of crop residues
7. Proper time of harvesting
8. Appropriate tillage operations
9. Close season practices

Biological Control – This involves the introduction of the natural enemies of pests to control or keep the pests population under control. Such enemies eat up or feed on these pests thereby reducing the population of the pests.

Chemical Control –

Chemical control involves the use of chemicals called pesticides to control pests of crop plants. These chemicals which are in form of powder, liquid, granules and tablets are used on the insects by various methods like spraying or dustings seeds or plants to check pests. Examples of such chemicals include:

- Pesticides – chemicals to control pests
- Insecticides – chemicals to control insects
- Rodenticides – chemicals to control rodents
- Avicides – chemicals to control birds
- Nematicides – chemicals to control nematodes

The micronutrients are boron, chlorine, cooper, iron, manganese, molybdenum, and zinc. These plant food elements are used in very small amounts, but they are just as important to plant development and profitable crop production as the major nutrients. Especially, they work “behind the scene” as activators of many plant functions.

Insecticide

An insecticide is a chemical prepared used for the control of pest.

Types of insecticides

There are 4 major forms of insecticides used in the control of pest.

a. Powder – mode of action is by contact

b. Liquid – mode of action is systemic

c. Granules – mode of action is through stomach

d. Gaseous – mode of action is by fumigation

Crops and Major pests

Crop	Pests
Beans	Beans weevils (Callosobronchus maculatus)
Rice	Rice weevil (Sitophilus oryzae), stem borers, army worms and leaf rollers
Maize	Maize weevils (sitophilus zea), stem borers and army worms
Yam	Yam beetles and rodents
Cocoa	Stem borers, root mealy bug, aphids, black tea thrips, and scales
Groundnut	Leaf worm aphids, boll worms, snail and hoppers
Cotton	Cotton strainers and boll worms
Sorghum	Weevils, boll worms, aphids and sorghum midge
Stored grains	Weevils

Effects or Economic Importance of Insect Pests in Crop Production

1. Insect pests destroy crops in the field through their biting, chewing, boring, sucking and defoliation activities
2. They cause reduction in the viability of stored produce
3. Site of injuries by insects may predispose crops to disease attack
4. They increase the cost of production during the course of controlling them

5. They render vegetables and fruits unattractive and unmarketable
6. Some are carriers or vectors of diseases
7. The profits of farmers are reduced
8. They reduce the quality of produce either in the store or in the field
9. They generally reduce the yield of crops
10. They can also cause total death of crop plants

Side effects of Various preventive measures

Cultural Method of Control

- Use of fire to kill harmful pest may result in destruction of other useful organisms
- Resistant varieties may adapt to the environment causing resistance to be shortlived
- Fire may spread to other farms if not properly managed
- Use of fire may cause loss of organic matter of soil and destruction of soil structure

Chemical Method of Control

- Some beneficial insects and soil organisms may be destroyed
- Pests and diseases may develop resistance
- Chemicals used may be toxic to man and crops
- It may leave undesirable residual in the environment
- Some chemicals washed out through water, soil erosion may cause pollution to larger rivers

Biological Method of Control

- New organism introduced may start attacking crops
- Predators expected to control other may rather feed on other beneficial insects

- Introduction of new organisms may cause imbalance in the ecosystem

Practice Questions

Use the options listed to answer the questions 1 – 3 below

Insecticide, Nematicide, Avicides, Pesticides, Rodenticides

1. ____ chemical is used to control pests
2. ____ chemical is used to control birds
3. _____ chemical is used to control nematode
4. List three economic importance of pests
5. What are the side effects of chemical method

Answers

1. Pesticide
2. Avicides
3. Nematicide
4. and 5 can be seen in the note above.

Week 2

Topic: Factors of Production

Meaning of Production

Production can be defined as the transformation of raw materials into finished goods. It is concerned with all legal activities which are directed towards the satisfaction of human wants.

Human wants are many, but they can be divided into material wants and non-material wants. The material wants are referred to as goods while the non material wants are called services.

Production involves the conversion of raw materials and semi finished goods into tangible goods that can satisfy the needs of the people. Examples of tangible goods are: yam, rice, clothes, cars, radio etc.

Factors of Production can be defined as the basic resources or agents used for producing goods and services. Factors of production make it possible for goods to be produced in the required quantity and quality.

The factors of production are land, labor, capital and entrepreneur.

LAND: The land is a free gift of nature; it refers to the resources provided by nature to aid the production of goods and services. Examples of land are rivers, farmlands, seas, the fishes in them, forestry minerals such as coal, crude oil, iron etc. Others are the climatic conditions like rain, sunshine, animals etc.

Features of Land

The following points below are the features/ characteristics of land

- Land is geographically immobile i.e the location of land cannot be changed, it is fixed.
- Land can appreciate or depreciate in value. The value of land varies from one location to another.
- It is a free gift of nature
- It is abundant in some areas and scarce in some areas

- It is heterogeneous in quality, differing from one lace to another in topography, soil texture and structure, soil fertility
- The supply of land is limited and is also subject to diminishing returns
- Availability of land is subject to Land Use Act/Law
- Its suitability influences output
- It can be used as a collateral for loan
- The reward for labor is RENT

Uses of Land

1. Production of Food crops – Land is used for the production of food crops such as Yam, Rice, Beans, Cocoa yam, as well as production of cash crops such as Cocoa, Cotton, Rubber, Groundnut etc
2. Livestock Production – Land is also used for natural grazing of livestock like cattle, sheep, and goats.
3. Forestry – Land is used for forestry which involves the management of the forest and its resources for man's use.
4. Wild Life Conservation
5. Fishery – For production of fish

Non Agricultural Uses of Lands

1. Residential purpose – Construction of houses and buildings
2. Transportation – Construction of Roads, Bridges, Rail ways etc
3. Mining – Coal, petroleum and other mineral resources are found on land

Assessment

1. Mention 4 unique characteristics of land
2. List 3 Agricultural uses of land

Week 3

TOPIC : Factors of Production – Labour

LABOUR: Labour is the mental or physical efforts of man which is directed towards the production of goods and services. Examples of labor are the work of farmers, carpenters, teachers, policemen etc.

Features of Labour

- Labour is mobile i.e. can move from one location to another
- Labour controls other factors of production
- Labour has feelings
- Labour requires motivation
- Labour is not fixed
- Labour is a human factor
- The reward for Labour is WAGE

The important peculiarities of labour are:

1. Labour is inseparable from the labourer: Here labour means a quantum of work performed while labourer means who perform the work (e.g. labour). Therefore, the labour's work has to be delivered in person.
2. Labourer sells his services not himself: If labourer is employed means an employer only pays in the form of wages on account of services received from the labourer. Thus labourer is only selling his services not himself.
3. Labour is more perishable than other commodity: If time passes, it lapses forever. Therefore a day lost which out work means the days work gone for ever. That is why many times workers have to accept lower wages rather than earn nothing.
4. Labourer has not the same power of bargaining as their employers. This is because labour can not be stored up and labourers are poor and ignorant.

5. Man, not a machine: A labourer differs from machine. He can not render services like machine. After all labourer is man and he has feelings and likings. If good surrounding, health, recreation is provided, he can work efficiently otherwise he will not work efficiently.
6. Less mobile: Generally labourer does not want to leave his home. It is therefore labour is such less mobile a compared to other factors.
7. Supply Independent of its demand: The supply of labour is always independent of its demand and cannot be easily and quickly increased or decreased. If supply of labour is surplus, their numbers can be reduced only by a painful process of starvation. But when sudden increase demand for labour, as during war, wages will rise but supply can not be quickly increased.
8. Labourer differs in efficiency: Like machinery every worker can not render same quantum of work labourer they very inefficiency and therefore wages differ from labourer to labourer.

Assessment

Mention 4 characteristics of Labour

Week 4

Topic: Factors of Production – Capital

CAPITAL: Capital is defined as the man made assets used in production. It is the man made wealth used in the production of other goods. The reward for capital is "INTEREST".

Capital as factor of production includes all material resources (excluding land) or stock of wealth used productively. The meaning of Capital in economics is more precise and restricted than its meaning to a businessman or an accountant. A stock of money, shares in a company or a private hoard of consumer goods is not capital.

Capital is used in all production except the most primitive form. A spade is capital to a market gardener. Machinery, factories, railways, roads, producers' stock of material, equipment and partly finished or finished goods are all capital.

Features of Capital

- Capital is man made
- Capital is durable
- Capital exist in different forms
- It promotes division of labour
- Capital exist in different forms
- Can be created by an excess of production over consumption.
- Must be maintained because it deteriorates with age and use.
- A proportion of the value of land is capital factor of production due to additions of fertilizers, fencing, drainage.
- Yields an income in the form of improved production.
- Is mobile in the long run, but specific moderately.
- Must be represented by savings.
- Ownership can be separated from control of its uses.

- Round-about process of production makes stocks in warehouses and shops capital.

Physical or Tangible Capital:

The material things which are used as inputs in the production of future goods are called tangible capital. The major categories of tangible capital office buildings, power plants, factories, ware-houses, machines, inventories of inputs, roads, highways, etc.

Intangible Capital:

Intangible capital consists of non material things that contribute to the output of future goods and services. For example, investment by a firm in advertising to establish a brand name, or establishing a training programme for employees to increase their still (human capital) is an input and so included in capital.

Functions of Capital:

Capital occupies an important position in determining the rate of economic development in the country. The main functions of capital, in brief, are as under:

(i) Capital provides equipment which help in the process of economic development.

(ii) An increase in the stock of capital goods like machinery factories, equipment, buildings, economic overhead capital (transport, railroad, communication, etc) and equipment for education, health, shelter etc., enhances the growth of output per capita and consequently the income per capital raised.

(iii) The accumulation of capital makes the labor better equipped and delays the operation of law of diminishing returns in agriculture and industry to a great extent.

(iv) Capital determines the quantity and also the composition of output in the economy.

(v) Capital puts the economy on the path to development. It results, in technological discoveries.

(vi) The availability of capital helps in the creation of employment opportunities in the country.

(vii) Capital adds value to the products.

(viii) An increase in the stock of capital once initiated feeds on itself. The process of capital formation thus becomes interacting and cumulative.

Assessment

Mention 4 characteristics of Capital as a factor of Production

Week 5

Topic: Factors of Production – Entrepreneur (Farm Manager)

ENTREPRENEUR: The entrepreneur is the person who combines the all other factors of production. He coordinates and directs the factors of production to produce goods and services.

An entrepreneur is a person who organises the other factors and undertakes the risks and uncertainties involved in the production. He hires the other three factors, brings them together, organises and coordinates them so as to earn maximum profit. For example, Mr. X who takes the risk of manufacturing television sets will be called an entrepreneur.

An entrepreneur acts as a boss and decides how the business shall run. He decides in what proportion factors should be combined. What and where he will produce and by what method. He is loosely identified with the owner, speculator, innovator or inventor and organiser of the business. Thus, entrepreneur ship is a trait or quality owned by the entrepreneur.

Features of Entrepreneur

- The entrepreneur takes the risk in a business
- He coordinates and manages all the other factors of production
- The entrepreneur makes the decision in the organization
- Provides the capital
- The reward for an entrepreneur is “profit”

Functions

An entrepreneur performs the following functions:

(i) He conceives the idea of launching the project.

(ii) He mobilizes the resources for smooth running of the project.

(iii) The decision of what, where and how to produce goods are taken by the entrepreneur.

(iv) He undertakes the risks involved in production.

(v) He is an innovator. He innovates new techniques of production, new products and brings improvements in the quality of existing products. He is in fact the captain of the industry.

Farm Manager

A farm manager is responsible for the management and general maintenance of a farm. On a crop farm, a farm manager will supervise the fertilizing, planting, spraying, cultivating and harvesting procedures of crops. On a livestock farm, he or she will supervise the general care of the animals and be diligent in the control of illnesses.

What does a Farm Manager do?

There are many types of farms that a farm manager might be in charge of running. The four main types of farms include:

Crop farms –

This type of farm specializes in growing cultivated plants that are mainly harvested for food, clothing and fuel. The most common crops include grain, cotton, fruit, and vegetables. A farm manager that works on this kind of farm is responsible for tilling, planting, fertilizing, spraying, cultivating, and harvesting crops. After the harvest, the farm manager will make sure the crops are properly stored and packaged for purchase.

Horticulture –

Horticulture is defined as the branch of agriculture that deals with the art, science, and business of plant cultivation. A farm manager that works on this kind of farm oversees the production of ornamental plants and nursery products such as flowers, shrubbery, fruits, vegetables, nuts, seeds, and herbs, to name a few.

Aquaculture –

Aquaculture farmers raise organisms like fish, crustaceans, molluscs, and aquatic plants. This could be in marine, brackish, or fresh water. These farm managers help to stock, feed and raise these types of aquatic life to be sold for consumption or for recreational fishing.

Livestock –

This type of farm raises domesticated animals for labour purposes or to produce commodities such as fibre and food. Some farms may specialize in one or multiple kinds of livestock. Some of the more common livestock farms include cows, chickens, sheep, pigs, goats, and horses. The farm managers are in charge of getting the animals fed and watered, and also keeping them healthy. They need to make sure the barns, pens, and coops where they are kept, are in clean and liveable condition. They also oversee all breeding activities.

Assessment

Mention 3 functions of a Farm Manager

Week 6 & 7

Week 6 – Mid Term Test

Week 7 – Excursion to a well-established farm.

Students are to go on a field trip excursion – visit a

Well-established farm, ask questions.

Week 8 & 9

Topic: Functions and Problems of a Farm Manager

FARM MANAGER: A farm manager is the person charged with the responsibility of directing the affairs of the farm administratively and technically. A farm manager is responsible for the management and general maintenance of a farm. He supervises fertilizing, planting, spraying, cultivating and harvesting procedures of crops and supervises the general care of the animals and be diligent in the control of illnesses for livestock.

FUNCTIONS OF A FARM MANAGER

i) Evaluation: The farm manager makes judgment on the number of inputs in terms of labour and machinery that is needed on the farm.

ii) Marketing: He ensures that farm produce gets to the market and fetch a good price. He has to ensure the produce are well stocked to the market in terms of packaging. He determines the quantity of produce to sell, at what price to sell, when to sell for maximum profit.

iii) Administration: Farm manager is concerned with the supervision of work in the farm, direct staff on day to day activities, rewards or disciplines staff according to their performance, makes arrangement for staff welfare. He administers the overall affairs of other workers on the farm and ensure they are well paid and dedicated to their duties.

iv) Organisation: The farm manager by extension is the entrepreneur, because he puts labour and machinery to work. He uses his wisdom to determine how much labour is needed to supplement machinery. The manager determines how to procure credit loan, the scale of production, what to produce, how to produce, the employment of staff, etc.

v) Production: Production is done when planted crops are harvested. It is the duty of the farm manager to decide when it is time to harvest. The farm manager is responsible for the purchase and use of farm inputs, ensures the health of crops or animals on the farm. He ensures the use of modern farming techniques and makes arrangement for the security of farm produce.

PROBLEMS FACED BY FARM MANAGERS

i) Inadequate capital due to the fact that the collateral security to obtain loan is not there or the interest rate is too high.

ii) Government policies discourage good farm activities like restricting importation of materials.

iii) Marketing problems like not knowing how, when, where to sell farm products.

iv) Farm input may not be adequate.

v) Poor research information due to extension problem.

vi) Transport problem with regard to roads, vehicles and spare parts.

vii) The staff caliber may also affect his performance.

A farm manager needs:

- good planning and problem-solving ability
- to enjoy working outside in all kinds of weather
- good communication and organisational skills
- a responsible attitude and to be able to work independently
- to be comfortable working with animals
- mechanical aptitude and to be able to work with computers
- To be able handle isolation and minimal social interaction.

Assessment

What are the problems a farm manager faces?