ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS INSTITUTION
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24AG201

CROP PRODUCTION TECHNOLOGY

UNIT I – Agriculture And Crop Production

a. Food processing industries
b. Cut flower production and export
c. Medicinal and aromatic plant based industries
d. Urban horticulture based home gardens, roof top gardens

b) **Development on organic production, organic pest management products** by utilizing the vast biosphere of the Western Ghats etc.

Land utilization statistics in India

Sl. No	Utilization pattern	Area in Mha
1	Total geographical area	328.8
2	Total reporting area	304.3
3	Area under cultivation	134.0
4	Total cropped area	179.8
5	Area sown more than once	36.8
6	Area not available for cultivation	161.3
7	Area under forest	66.4

BRANCHES OF AGRICULTURE

Horticulture – is the branch of agriculture that deals with the art, science, technology, and business of growing plants. It includes the cultivation of medicinal plants, fruits, vegetables, nuts, seeds, herbs, sprouts, mushrooms, algae, flowers, seaweeds and non-food crops such as grass and ornamental trees and plants.

- Horticulturists apply their knowledge, skills, and technologies used to grow intensively produced plants for human food and non- food uses and for personal or social needs.

- Their work involves plant propagation and cultivation with the aim of improving plant growth, yields, quality, nutritional value, and resistance to insects, diseases, and environmental stresses. They work as gardeners, growers, therapists, designers, and technical advisors in the

food and non-food sectors of horticulture. Horticulture even refers to the growing of plants in a field or garden

Forestry- is the science and craft of creating, managing, using, conserving, and repairing forests and associated resources to meet desired goals, needs, and values for human benefits.

- Forestry is practiced in plantations and natural stands. The science of forestry has elements that belong to the biological, physical, social, political and managerial sciences.
- Forest ecosystems have come to be seen as the most important component of the biosphere, and forestry has emerged as a vital applied science, craft, and technology

Animal husbandry- is the management and care of farm animals by humans, in which genetic qualities and behavior, considered to be advantageous to humans, are further developed. The term can refer to the practice of selectively breeding and raising livestock to promote desirable traits in animals for utility, sport, pleasure, or research

- In Animal Husbandry the animals are being produced, maintained, etc.
- Maintenance of various types of livestock for direct energy (work energy).

Fisheries - Generally, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery. According to the FAO, 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, and purpose of the activities or a combination of the foregoing features"

Agricultural Engineering – It is an important component for crop production and horticulture particularly to provide tools and implements. It is aiming to produce modified tools to facilitate proper animal husbandry and crop production tools, implements and machinery in animal production.

- **Soil and water conservation engineering.** Modified irrigation methods, irrigation tools and technology are all being developed and evolved
- **Farm Machinery and Power:** When the human and animal powers become limited and expensive and also very inefficient, modernization of tools and implements are being developed.

- **Food Processing Engineering:** The food industry is a complex, global collective of diverse business that supply most of the food consumed by the world population.

Home Science – Application and utilization of agricultural produces in a better manner. When utilization is enhanced production is also enhanced.

- Family and consumer sciences (home economics or home science) is the profession and field of study that deals with the economics and management of the home and community.

- The field represents many disciplines including consumer science, nutrition, food preparation, parenting, family economics, human development, interior design, textiles, apparel design

AGRONOMIC CLASSIFICATION

Field crops can be classified according to their economic importance as follows:

1- **Cereal or grain crops:** Cereals are grasses grown for their edible seeds such as wheat, barley, rice, maize, and grain sorghum, Millets - such as pearl millet,,common millet,fox tailmillet,Kodo millet,barnyard millet.

2- Legumes of seeds such as blackgram, greengram, redgram, cowpea, soybean, chick pea, faba bean, fenugreek, lupine and lentil.

3- Oil crops: they include: peanut, sunflower, safflower, sesame, caster bean, flax, soybean and rape.

4- Sugar crops: they include sugar beet and sugarcane.

5- Fiber crops: they include cotton .Flax ,jute ,sisal ,and ramie.

6- Fodder crops : they include alfalfa, Egyptian clover, sorghum, Suddan grass,grasspea, lablab, Napier grass, millet, white clover,and red clover

7- Rubber crops: including para rubber, Castilla rubber, and guayule.

8- Tuber crops: such as potatoes and Tapioca

9- Root crops: such as sweet potatoes and sugar beet.

10- Medical plants: such as caster bean and others.

11- Stimulates such as tobacco, tea and coffee.

FACTORS AFFECTING CROP GROWTH

Growth: Growth may be defined as the progressive development of an organism. It is irreversible increase in size or weight

General crop growth curve: It consists of 5 distinct phases

1. Initial lag phase: increase in size or weight is very slow
2. Grand growth period: Very fast and log of growth plotted against time give straight line
3. Decreasing growth rate: A phase in which the growth rate gradually diminishes
4. Plateau period: The point at which the organism reaches maturity and agro with ceases
5. Senescence and death of the organism

INTERNAL FACTORS

Genetic factors

The increase in crop yields and other desirable characters are related to Genetic makeup of plants

- High yielding ability
- Early maturity
- Resistance to lodging
- Drought flood and salinity tolerance
- Tolerance to insect pests and diseases

- Chemical composition of grains(oil content, protein content)
- Quality of grains(fineness)
- Quality of straw(sweetness, juiciness)

EXTERNAL FACTORS CLIMATIC FACTORS: THEA TMOSPHERIC

- Temperature
- Solar radiation
- Precipitation
- Atmospheric humidity
- Wind velocity
- Atmospheric gases

Temperature

- Temperature is a measure of intensity of heat energy. The range of temperature for maximum growth of most of the agricultural plants is between 15 and 40oC

Crops	**Min.tempoC**	**Opt.tempoC**	**Max.tempoC**
Rice	10	32	36-38
wheat	4.5	20	30-32
Maize	8-10	20	40-43
Sorghum	12-13	25	40
Tobacco	12-14	29	35

Solar radiation

Solar energy provides light energy required for photosynthesis and many other functions like seed germination, leaf expansion, growth of stem and shoot, flowering, fruiting and thermal

conditions for physiological functions of the plant. The effect of solar radiation may be classified into:

Rainfall/Precipitation

Precipitation includes all water which falls from atmosphere such as rainfall, snow, hail, fog and dew.

Rainfall one of the most important factor influences the vegetation of a place. Most crops receive water supply from rainwater.

- Total precipitation in amount and distribution greatly affects the choice of a cultivated crop in a place
- In heavy and evenly distributed rainfall areas, crops like rice in plains and tea, coffee and rubber in hilly areas are being cultivated.
- Low and uneven distribution of rainfall is common in dry land farming where drought resistance crops like bajra, sorghum and minor millets are grown.

Wind

Wind is the flow of gases on a large scale. On the surface of the Earth, wind consists of the bulk movement of air.

- In meteorology, winds are often referred to according to their strength, and the direction from which the wind is blowing.
- Short bursts of high speed wind are termed gusts. Strong winds of intermediate duration (around one minute) are termed squalls.
- Long-duration winds have various names associated with their average strength, such asbreeze, gale, storm, and tropical cyclone such as hurricane,typhoon,tropicalstorm, cyclonic storm,tropical depression, and simply cyclone

Atmospheric Humidity

Water is present in the atmosphere in the form of invisible water vapour, normally known as humidity.

If no moisture in air, the evaporatory demand is enormously high. Very low and very high relative humidity is not suitable for crop production. Relative humidity of 40 – 60% is suitable

for most of the crop plants. Very few crops can perform well when relative humidity is 80% and above, when relative humidity is high there is chance for the outbreak of pest and disease, e.g., brown plant hopper (BPH) in rice multiplies enormously.

Atmospheric gases on plant growth

- The growth of a plant is measured by photosynthates accumulation in the plant. The process of photosynthesis and the growth of a plant is affected by the composition of the atmosphere. The air contains, oxygen (20.95%), carbon dioxide (0.03%), nitrogen (78.09%), ans other gases.

- CO2– is important for Photosynthesis. It is taken by the plants by diffusion process from leaves through stomata. CO2 is returned to atmosphere during decomposition of organic materials from all farm wastes

- Oxygen is important for respiration of both plants and animals. During Photosynthesis,O2 is released by plants

- Certain gases like SO2,CH4, HF released to atmosphere are toxic to plants

EDAPHIC FACTORS

Edaphic is a nature related to soil. Plants grown in land completely depend on soil on which they grow.

The soil factors that affect crop growth are:

1. Soil moisture
2. Soil air
3. Soil temperature
4. Soil mineral matter
5. Soil organic matter
6. Soil organisms
7. Soil reactions

Soil moisture

Plant tissue contains 90% moisture.The moisture lost through transpiration is made up by absorbing water from soil.It is held by soil particles by cohesive and adhesive forces.

Soil air

- Aeration of soil is absolutely essential for the absorption of water by roots
- Germination is inhibited in the absence of oxygen
- O2 is required for respiration of roots and microorganisms.
- In poorly aerated soil the CO2 is accumulated and is detrimental to roots

Composition of soil and atmospheric air (Percentage by volume)

Soil temperature:

- The major source of heat is sun
- Specific heat is in calories required to raise the temperature of one gram of substance to one degree C

o The max absorption of water by root stake place generally between ST of 20 to 30oC

o Soil temp controls the microbial activity and processes involved in the nutrient availability

- Cold soils are not conducive for rapid growth of most of agricultural crops
- Nutrient availability is higher at optimum temperature

Soil mineral matter

- The mineral content of soil is derived from the weathering of rocks and minerals as particles of different sizes.
- These are the sources of plant nutrients eg; Ca, Mg, S, Mn, Fe, K etc

Soil Organic matter

- The soil Organic matter content varies from <1 % in arid soil to 30% in humid forest soil.