Chapter 1

Introduction to Agronomy

- The term **agriculture** is derived from the **Latin** words '**ager**' or '**agri**' meaning '**soil**' and '**cultura**' meaning **cultivation**.
- **Agriculture** is a very broad term encompassing all aspects of crop production, livestock farming, fisheries, forestry *etc*.
- **Agronomy** is a branch of agricultural science which deals with principles and practices of soil, water and crop management.
- **Agronomy** can also be defined as a branch of agricultural science that deals with methods which provide favourable environment to the crop for higher productivity.
- **Agronomy** is derived from **Greek** words **agros** meaning '**field**' and **nomos** meaning '**to manage**'.
- **Norman** (1980) has defined **agronomy** as the science of manipulating the crop environment complex with dual aim of improving agricultural productivity and gaining a degree of understanding of the process involved.
- **Agronomy** deals with different management practices like tillage, seeds and sowing, nutrient management, water management, weed management, harvesting, storage and marketing.
- **Agronomy** is a synthesis of several disciplines like soil science, agricultural chemistry, crop physiology, plant ecology, entomology and plant pathology.
- **Agronomy** is an **art, science** and a **business.**
- As an **art**, **agronomy** refers to the knowledge of the way to perform the operations of the farm in a skillful manner but do not necessarily include an understanding of the principles underlying farm practices.
- Both **physical** and **mental skills** are essential for successful crop production.
- **Agronomy** is a **science**, because scientific principles are freely used for production of quality crops.

- **Agronomy** is a **business**, because small and marginal farmers take crop production on subsistence levels but progressive and large farmers consider it to maximize production as well as profit.
- **Pietro 'De' Crescenzi** is regarded as **father of Agronomy.**
- **Agrostology** is a branch of science which deals with the study of grasses, their classification, management and utilization.
- **Environment** is defined as the aggregate of all the external conditions and influences affecting the life and development of an organism.
- **Crop production** is basically conversion of environmental inputs like solar energy, carbon dioxide, water and soil nutrients into economic products in the form of human or animal food or industrial raw materials.
- Season for raising each crop has to be selected to attain highest productivity from available climatic resources.
- The earliest man, ***Homo erectus*** emerged around **one and half million years** ago and by about a million years ago he spread throughout world tropics and later to temperate zones.
- ***Homo sapiens***, the direct ancestor of modern man lived **250 thousand years** ago.
- ***Homo sapiens sapiens***, the modern man, appeared in Africa about **35 thousand years** ago.
- **India's** most important contribution to world agriculture is **rice**, the staple food crop of most of south, south-east and east-Asia.
- **Sugarcane**, **number of legumes** and tropical fruit like **mango** are natives of India.
- **Indian agriculture** is predominantly of **subsistence type**.
- Several crops like potato, sweet potato, tomato, chillies, groundnut, cashewnut, tobacco, American cotton, arrow root, cassava, pumpkin, papaya, pineapple, guava, custard apple and rubber were introduced into India by **Portuguese** during **16th century A.D**.
- In pre-scientific agriculture, six persons could produce enough food for themselves and for four others. In years of bad harvest, they could produce only enough for themselves.
- With the development of agricultural science and application of advanced technology, five persons are able to produce enough food for 95 others.

- Scientific agriculture began in India when sugarcane, cotton and tobacco were grown for export purposes.

Important events in history of agriculture

8700 B.C. – Domestication of sheep

7700 B.C. – Domestication of goat

7500 B.C. – Cultivation of crops (wheat and barley)

6000 B.C. – Domestication of cattle and pigs

4400 B.C. – Cultivation of maize

3500 B.C. – Cultivation of potato

3400 B.C. – Wheel was invented

2900 B.C. – Plough was invented

2200 B.C. – Cultivation of rice

1800 B.C. - Cultivation of fingermillet

1725 B.C. – Cultivation of sorghum

1500 B.C. – Cultivation of sugarcane. Irrigation from wells.

1400 B.C. – Use of iron

15 Century A.D. – Cultivation of sweet orange, sour orange, wild brinjal, pomegranate

16 Century A.D. – Introduction of crops into India by Portuguese.

- Experiments pertaining to plant nutrition in a systematic way were initiated by **Van Helmont** (1577-1644 A.D.).
- **Van Helmont** claimed that plants require only water to grow and concluded that the main principle of vegetation is water.
- **Francis Bacon** stated that **water** was the **principal nourishment for plants**.
- **Glauber** claimed that plants needed only **saltpeter (potassium nitrate)** to grow.
- **Jethro Tull** suggested that plant roots directly absorb soil particles.
- **Jethro Tull** conducted experiments on cultural practices, developed **seed drill** and **horse drawn cultivator**.
- **Jethro Tull** published a book '**Horse Hoeing Husbandry**'.
- **Woodward** stated that terrestrial matter or earth rather than water was the principle of vegetation.

- **Thaer** regarded soil humus as the source of **carbon** for plants.
- **Theory of humus** formulated in the year **1809**.
- **Boussingault** first stated that plants derive carbon from air.
- **Liebig** is regarded as the **founder of modern agricultural chemistry** and enunciator of the **Law of minimum (1843).**
- **Arthur Young** (1741-1820 A.D.) conducted **pot culture experiments** to increase the yield of crops by applying several materials like poultry dung, nitre, gun powder *etc*.
- **Arthur young** published his work in 46 volumes as '**Annals of Agriculture**'.
- In 1837, **Lawes** began to experiment on the effect of manures on crops.
- In 1842, **Lawes** patented a process of treating phosphate rock to produce superphosphate and thus initiated the synthetic fertilizer industry.
- World's **oldest permanent field experiments** located at **Rothamsted, UK.**
- Establishment of long-term field experiments at Rothamsted (UK) in **1834** by **Lawes and Gilbert.**
- Long-term fixed plot 'manurial' experiments were started at **Kanpur** in UP, **Pusa** in Bihar, **Coimbatore** in Tamil Nadu, **Padegaon** in Maharashtra, **Shanjahanpur** in UP.
- **Oldest manurial trials** established in India in **Kanpur**, UP.
- All manurial trials except Coimbatore had been demolished. Long-term manurial experiment at **Coimbatore** is **still continuing.**
- **YL Nene (Virologist)** first discovered field-scale **zinc deficiency** in India at **Pantnagar.**
- **Bray** developed nutrient mobility concept in soils.
- **Hellriegel and Wilfarth** discovered that legumes can fix atmospheric N with the help of bacteria.
- **Beijerinck** isolated the bacteria responsible for N fixation in symbiosis with legumes.
- ***Bacillus radicicola*** was the **earlier name** of **rhizobium.**
- **Beijerinck** isolated ***Rhizobium***, ***Azotobacter*** and ***Azospirillum.***
- **Gregor Johann Mendel** discovered **laws of heredity** in 1866.

- In 1876, **Charles Darwin** published the results of experiments on **cross and self-fertilization** in plants.
- **Robert Ransome** patented a **cast iron share** in 1785.
- **DDT** was first synthesized in 1874 by **Dr. Paul Muller**.
- **Wholer** first synthesized urea in **1928.**
- In **1870**, a **joint department of agriculture, revenue and commerce** was established in India.
- In **1905**, **Imperial Agricultural Research Institute** was started at **Pusa**, **Bihar**.
- In **1912**, **Sugarcane Breeding Institute** was established in **Coimbatore** as a branch of Imperial Agricultural Research Institute.
- Several agricultural colleges and agricultural research stations were started in **1929**.
- After the **earthquake of 1936**, **Imperial Agricultural Research Institute** was **shifted** from Pusa to Delhi.
- **Agricultural Universities** were started in India from **1964** onwards in different states.

ROLE OF AGRONOMIST

- **Agronomist** aims at obtaining **maximum production** at **minimum cost**.
- **Agronomist** is concerned with production of food and fibre to meet the needs of the growing population.
- **Agronomist** is a key person working with knowledge of all agricultural disciplines and **coordinator** of different subject matter specialists.