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 finger millet
- 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 radiicola 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.